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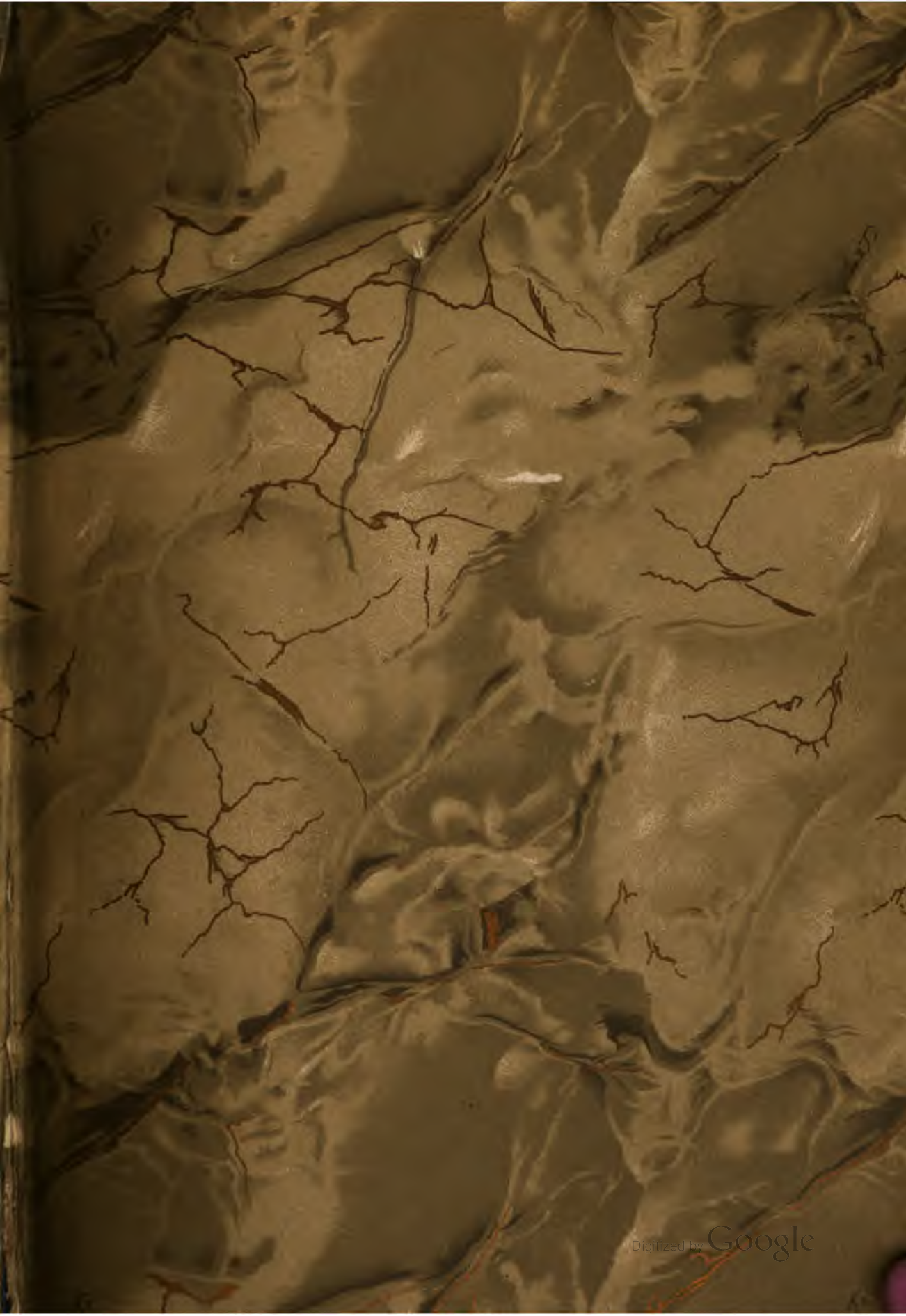
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## KEY TO PRONUNCIATION.

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ā	far, father	ñ	Span. ñ, as in <i>cañon</i> (căn'yôn), <i>piñon</i> (pên'yôn)
â	fate, hate	ng	mingie, singing
ä or ǣ	at, fat	nk	bank, ink
ā	air, care	ō	no, open
ạ	ado, sofa	o or ố	not, on
â	all, fall	ô	corn, nor
ch	choose, church	ó	atom, symbol
ē	eel, we	ọ	book, look
e or ě	bed, end	oi	oil, soil; also Ger. <i>eu</i> , as in <i>beutel</i>
é	her, over: also Fr. <i>e</i> , as in <i>de</i> ; <i>eu</i> , as in <i>neuf</i> ; and <i>œu</i> , as in <i>boeuf</i> , <i>cœur</i> ; Ger. <i>ö</i> (or <i>oe</i> ), as in <i>ökonomie</i> .	ō or oo	fool, rule
ẹ	befall, elope	ou or ow	allow, bowsprit
ē	agent, trident	s	satisfy, sauce
ff	off, trough	sh	show, sure
g	gas, get	th	thick, thin
gw	anguish, guava	th	father, thither
h	hat, hot	ti	mute, use
h or H	Ger. <i>ch</i> , as in <i>nicht</i> , <i>wacht</i>	u or ü	but, us
hw	what	ú	pull, put
i	file, ice	ü	between u and e, as in Fr. <i>sur</i> , Ger. <i>Müller</i>
i or ĭ	him, it	v	of, very
ı	between e and i, mostly in Oriental final syllables, as, Ferid-ud-din	y	(consonantal) yes, young
j	gem, genius	z	pleasant, rose
kw	quaint, quite	zh	azure, pleasure
ñ	Fr. nasal <i>m</i> or <i>n</i> , as in <i>embonpoint</i> , <i>Jean</i> , <i>temps</i>	' (prime), " (secondary)	accents, to indicate syllabic stress

# THE AMERICANA

**N**eu Brandenburg, noi-brân'dën-boorg, Germany, a town of the grand-duchy of Mecklenburg-Strelitz, 20 miles northeast of Neu Strelitz near Lake Tollense. It was founded in 1248, and retains its picturesque mediæval ramparts and gateways. Its chief edifices are the Belvedere palace, and a 13th century Gothic church. It has manufactures of pianos, machines, paper, etc. Pop. (1900) 10,560.

**Neu-Lauenburg**, noi low'ën-boorg, formerly DUKE OF YORK ISLAND, an island of the Bismarck Archipelago (q.v.) off the west coast of New Mecklenburg.

**Neu Pommern**, noi pöm'ërn. See NEW POMERANIA.

**Neuchâtel**, né-shâ-têl, or **Neufchâtel**, Switzerland, the name of a canton, town, and lake. (1) The canton in the west of the country, bounded by the cantons of Bern and Vaud, the lake of Neuchâtel, and France, has an area of 312 square miles. It lies in the midst of the Jura Mountains, four chains of which, running from northeast to southwest, traverse the canton, and are separated by elevated, longitudinal valleys. The greater number of the numerous streams which water the canton flow into the Rhine; several are feeders of the Lake of Neuchâtel mentioned below. Chief of the minerals is the asphalt of Val de Travers. Grazing is extensively attended to; wine, absinthe, fruits, hemp, and flax are produced. The manufactures are important; the principal are lace, cotton, clocks, and watches; a considerable industry is also carried on in cutlery, mathematical and philosophical instruments, chintz, and other cotton stuffs. The famous Neuchâtel cream-cheeses, however, are made, not in this canton as popularly supposed, but in France, at Neuchâtel-en-Bray, a small Norman town, 25 miles southeast of Dieppe by rail. Neuchâtel was an independent principality as early as 1034. After various changes of masters it came into the hands of the old French family of Longueville (1504), which became extinct in 1707. The king of Prussia, as heir of the house of Orange, was then called to the sovereignty by the states of Neuchâtel, and his title was confirmed by the Treaty of Utrecht. In 1806 Prussia ceded it to France, and the emperor conferred it on Marshal Berthier, afterward Prince of Neuchâtel-Wagram. By the Peace of Paris it was restored, with additions, to Prussia. In 1814 the principality was received into the Swiss Confederacy, and it was the only canton with a monarchical government, which it preserved till 1848. The religion is Protestant (Reformed). The language is French; but German is also spoken. Neuchâtel furnishes 960 men to the army of the Swiss Confederacy. Pop. (1900) 126,279.

(2) The capital, Neuchâtel, is 24 miles west of Bern, on a steep slope above the northwest shore of Lake Neuchâtel. It has an old Gothic church of the 12th century; many charitable institutions; a gymnasium or college, containing a valuable natural history collection found-

ed by Professor Agassiz, a native of the town, etc. It has various manufactures and an extensive trade. Pop. (1901) 20,843.

(3) The Lake of Neuchâtel (Neuenburgersee), 1,420 feet above sea-level, is 25 miles long, from three to six miles wide, with a maximum depth of 472 feet. The Thiele serves as its outlet, and carries its waters into the neighboring Lake of Bienné, and thence into the River Aar which communicates with the Rhine. The lake is plentifully supplied with fish; steamers ply on its waters between Neuchâtel, Morat, Yverdon, Estavayer, etc.

**Neuendorff**, noi'ën-dörf, **Adolph Heinrich Anton Magnus**, American musician: b. Hamburg, Germany, 13 June 1843; d. New York 4 Dec. 1897. He came to the United States when 12, was educated in the public schools and pursued a course in music. At 15 he made his début as a pianist, and the next year he led a chorus and played in an orchestra. In 1864 he was musical director of the German Theatre, Milwaukee, Wis., and in 1865 he conducted the German grand opera in New York. He founded the Germania Theatre in 1872 and managed it for 11 years; he assumed the leadership of the Philharmonic Society of New York in 1878, and later became director of the Metropolitan Orchestra. Among his compositions are: 'The Rat Charmer of Hamelin' (1880); 'Don Quixote' (1882); 'Prince Waldmeister' (1888), etc.

**Neuhof**, noi'höf, **Theodor von**, BARON, German adventurer, King Theodore I. of Corsica: b. Metz 1686; d. London 11 Dec. 1756. His father was a Westphalian noble in the French service; the son became page to the Duchess of Orleans; fought in the French and in the Swedish armies; was employed by Count Goertz and then by Alberoni on diplomatic errands; married Lady Sarsfield, whom he deserted, having stolen her diamonds; lost all his property in Law's schemes; went to Florence in 1732; and there intrigued with some Corsican revolutionists, at whose invitation he landed in Corsica in 1736, with arms and equipment furnished by the Bey of Tunis, and was proclaimed king. He was at first successful against the Genoese, who, however, were reinforced by the French during Neuhof's absence in Holland; and he was defeated upon his return in 1738. After the withdrawal of the French in 1741, he made several attempts in 1743 to recover his kingdom and in 1749 retired to England, where he was jailed for debt, and was released in 1756, thanks to a subscription raised by Horace Walpole. His son, Colonel Frederick Neuhof, an English officer, wrote 'Mémoires pour Servir à l'Histoire de Corse' (1768). Consult Fitzgerald, 'King Theodore of Corsica' (1890).

**Neuilly**, né-yê, or **Neuilly-sur-Seine**, sūr sãn, France, a town in the department of Seine, suburban to Paris, immediately north of the Bois de Boulogne. The fine 18th century level bridge by Perronet, across the river here, is an attractive feature, and the town is noted for

its benevolent institutions, parks, and a handsome residential section built chiefly on the site of the historic royal castle and park of Neuilly, destroyed during the revolution of 1848. Neuilly also has factories of several Paris establishments for the production of domestic commodities.

**Neumann, noi'män, Franz Ernst**, German physicist and mineralogist: b. Joachimsthal 11 Sept. 1798; d. Königsberg 23 May 1895. He studied at Berlin, and became professor at Königsberg in 1828. His work in physics was of the greatest importance and he is reckoned the father of mathematical physics in Germany, and the founder of the modern theory of mineralogy by reason of his studies of the optical relations of crystals. He published a law of electro-dynamics different from that of Ampère and from Grassmann's; determined the diffusivity of soils and of metals; and studied reflection and refraction of light, induction currents, specific heat, etc. He contributed to various scientific journals. Many of his lecture courses were edited and published by his pupils; among these are 'The Theory of Magnetism' (1881), 'Introduction to Theoretical Physics' (1883), 'Theoretical Optics' (1885), 'Theory of the Potential' (1887), and 'Capillary Attraction' (1894). Consult the biography by Volkmann (1896).

**Neumann, John Nepomucene**, Roman Catholic bishop of Philadelphia: b. Prachatz, Bohemia, 28 March 1811; d. Philadelphia 5 June 1860. He was educated at Budweis and Prague; took orders; came to America as a missionary in 1836; engaged in work near Niagara for four years; in 1840 entered the Redemptorist Order; and became assistant pastor of St. James' Church, Baltimore, in 1842. He was again busied in mission work in Pennsylvania, Maryland and Virginia; was appointed superior of the Redemptorist Convent in Pittsburg, where he built the church of St. Philomena; returned to Baltimore in 1847 as provincial of the Redemptorists in America; established the Sisters of Notre Dame in this country; and in 1851 became bishop of Philadelphia. He went to Rome in 1854 and assisted in the definition of the dogma of the Immaculate Conception. Bishop Neumann was a man of culture and of administrative ability. Consult the 'Life' by Berger (translated into English by Grimm, 1884).

**Neumann, Karl Friedrich**, German Orientalist: b. Reichmansdorf, Bavaria, 22 Dec. 1798; d. Berlin 17 March 1870. He was educated at Heidelberg, Munich, and Göttingen, and after travels in India and China (1829-30) from which he returned with a great number of Hindu and Chinese books, was professor of Oriental languages at Munich 1831-52. He was a Liberal in politics, a circumstance which finally cost him the loss of his professorship. Among his many works are 'Mémoires sur la Vie et les Ouvrages de David Philosophie Arménien' (1829); 'Asiatische Studien' (1837); 'Geschichte der Vereinigten Staaten von Nordamerika' (1863-6); 'Hoen Schein, or the Discovery of America by Buddhist Monks' (1874).

**Neumann, Karl Gottfried**, German mathematician, son of F. E. Neumann (q.v.): b. Königsberg 7 May 1832; he studied at Königs-

berg, became instructor of mathematics at Halle in 1858, was made professor at Basel in 1863 and at Tübingen in 1865, and since 1868 has been professor at Leipsic. His publications and special studies have been in the field of mathematical physics (following his father) and in higher analysis. Among his books mention should be made of 'The Mechanical Theory of Heat' (1875), 'Hydrodynamic Studies' (1881), 'Some Points in Mathematical Physics' (1893), 'Newton's Law of Attraction' (1896).

**Neumayer, noi'mi-ër, Georg**, German meteorologist: b. Kirchheimbolanden, Bavaria, 21 June 1826; d. May 1909. He was educated at the University of Munich and went to Australia under the auspices of Maximilian II. and there founded the Flagstaff Observatory at Melbourne, where he made valuable magnetic observations. He returned to Germany in 1864 and promoted the German-African Company and organized several expeditions to the North and South Polar regions. He was long connected with the hydrographic bureau at Berlin and in 1876 became director of the Marine Observatory at Hamburg. He wrote: 'Die Beobachtungsergebnisse der deutschen Stationen im Systeme der internationalen Polarforschung' (with Börgen, 1886); 'Atlas des Erdmagnetismus' (1891); 'Anemometer-Studien' (1897); and 'Auf zum Südpol!' (1901).

**Neumayr, noi'mir, Melchior**, Austrian geologist: b. Munich 24 Oct. 1845; d. Vienna 29 Jan. 1890. He was educated in his native city and at Heidelberg, becoming docent at the latter university in 1872 and full professor of geology there in 1880. He traveled extensively in the Carpathian Mountains, the Alps, Italy, Dalmatia and elsewhere in southern Europe, studying the Jurassic formations. He published 'Die Stämme des Tierreichs: Wirbellose Tiere' (1890); 'Erdgeschichte' (1885-7); etc.

**Neumes, nūmz**, in music, (1) signs or characters in early music indicating tones or phrases. A large number of these characters were used, being more or less complicated in form and meaning. This was the first step toward a graphic musical notation. (2) Melodic phrases sung to a single syllable, more particularly at the end of a sentence or clause. (3) Modulation of the voice in singing. See MUSIC; MUSICAL NOTATION.

**Neumünster, noi'mün-stër**, Germany, a town in the Prussian province of Schleswig-Holstein, on the Schwale, 17 miles by rail southwest of Kiel. It is a well-built, busy manufacturing centre, producing principally woollens, and also leather, paper, ironware, soap, etc. Pop. about 30,000.

**Neuquen, nā-oo-kān'**, Argentina, a territory in the western part of the republic, bounded on the west by Chile. Its area is 42,345 square miles. The main range of the Andes Mountains crosses the western part from north to south, and numerous short ranges extend throughout the territory. The Rio Negro and its largest tributaries have their rise in Neuquen, and the Rio Colorado is on its northern boundary. The principal occupations are mining silver and cattle-raising. The population is mostly Indians, but since 1884 a number of Chileans have settled in the territory. The

## NEURALGIA—NEURASTHENIA

capital is Chosnalal in the northern part. Pop. about 18,000.

**Neuralgia** (Greek *νεῦρον*, nerve + *ἄλγος*, pain), severe paroxysmal pain, either along the course of one or more sensory nerves, or at the place of their distribution. In neuralgia proper no definite lesions are discoverable. Sometimes there is reason to believe that inflammation of the sheath of the nerve is the starting-point. Not infrequently there are well-defined points of tenderness (ascertained by palpation) over the affected nerve, especially where it emerges upon the skin from a bony groove or opening. Sometimes with the pain there is a twitching of adjacent muscles. Radiation of pain, neuralgic in character, to nerve-branches other than those affected is quite common. Dental caries, for example, may produce supra-orbital neuralgia, and uterine disease, occipital neuralgia. Neuralgic pains are described by the sufferers as cutting, burning, boring, lightning-like, crushing, etc. After a neuralgic attack the part affected has a feeling of discomfort and bruising. There is frequently also a sense of exhaustion, with a desire to sleep. If there are repeated attacks of neuralgia, pallor of the skin, followed by intense redness, by hyperæsthesia, or by loss of tactile sensibility in the part affected, horripilation and other evidences of vasomotor disturbances are not uncommon. The disease may attack any part of the body, but is most common in the face. When involving the facial branches of the fifth pair of nerves (the trifacial nerves) it is popularly called *tic-douloureux*. There are severe flashes of pain over the eyebrows, in the eyes, nose, lips, chin, teeth, etc.

Neuralgias affecting various parts of the body are named in accordance with the part affected. Sciatica, for example, is neuralgia of the sciatic nerve, the pain extending down the back portion of the thigh and into the calf of the leg. Enteralgia is neuralgia of the bowels; gastralgia, of the stomach, angina pectoris, of the heart; intercostal neuralgia, of the intercostal muscles; and myalgia of the muscles in general. The presence of neuralgia, especially with repeated attacks, usually indicates a weak state of the general system, which may follow long-continued fevers. The disease may occur during the progress of various acute affections. The causes of neuralgia are various: poor blood and malnutrition, pressure of a tumor upon a sensory nerve, irritation of the nerve from the swelling of an adjacent part, exposure to cold and wet, fatigue, mental emotion, the abuse of tea, coffee, and alcohol, etc. The treatment varies with the nature of the different cases. Hot applications and anodyne liniments are often of value. As the pain is severe, persons affected are too often tempted to resort to narcotics for relief. Such drugs should not be used without the advice of a physician.

**Neurasthenia** (from Greek *νεῦρον*, nerve + *ἀσθένεια*, weakness), a condition of nervous debility or exhaustion; popularly called nervous weakness, nervous prostration, etc. The term is now generally applied to a disordered condition of the nervous system manifested by various symptoms. It was originally used in 1879 by Dr. George M. Beard. Nervousness, so called, is manifested chiefly by undue sensitive-

ness to external impressions. It frequently precedes or progresses into nervous prostration. The distinction between hysteria (q.v.) and neurasthenia is not always plain, for the two affections frequently merge into one another. Neurasthenia is not a disease; it is a neurosis, a functional derangement, usually lasting a considerable time, but generally recovered from under proper hygienic and medicinal treatment. No morbid anatomical changes are at present known. The disorder is caused sometimes by various functional and organic affections of the body, but in these instances there is probably a pre-existing basis of functional perverted action of the nervous system. Neurasthenia so produced is known as symptomatic. When certain symptoms predominate, distinctive terms are sometimes used; for example, in acoustic neurasthenia, symptoms of deafness; in gastric neurasthenia, weak digestive action, gastric pain (nervous dyspepsia); in cardiac neurasthenia, palpitations, irregular action of the heart, præcordial pain, etc., symptoms simulating heart-disease; and in cerebral neurasthenia, despondency, irritability, moodiness, sleeplessness, restlessness, and confusion of mind, especially in relation to figures.

Neurasthenia is about as common among men as among women, and occurs usually between the ages of 20 and 50, when worry and work are maximal. Signs of a neurasthenic tendency are sometimes seen in young people (of a neuropathic or neurotic diathesis); namely, oversensitiveness, precocity, insomnia, chorea, somnambulism, and night-terrors. In girls especially there are also headache, backache, anæmia, and lassitude. Sometimes neurasthenia marks the beginning of mental disease, such as melancholia. The causes of neurasthenia may be classified as predisposing (such as heredity and a neurasthenic tendency), and exciting or acquired. Mental irritability and the loss of self-control in parents are causes. So also gout, syphilis, rheumatism, and chronic alcoholism are conditions that transmit neurasthenic tendencies. Improper mental and physical training of children, and too much coddling are often responsible for the affection. Among the exciting causes are: injuries; severe mental and physical work for a length of time beyond the individual's power of endurance; worry, especially if associated with lack of rest, of pure air and of suitable food; and the excessive concentration of the thoughts upon one's self. So common has neurasthenia become in the strenuous, competitive life of America, especially in cities, that it is sometimes spoken of as "the American disease." Most individuals naturally have more nervous force and energy than is required for the ordinary necessities of life; while neurasthenia appears most frequently among those not in robust health and who are particularly susceptible to nervous impressions, quick, versatile, sensitive, and perhaps talented persons. Still persons of strong physical and mental powers, by reason of dissipation, overexercise, overeating and drinking, late hours, etc., may unduly tax their reserve supply of nervous energy, and sooner or later exhaust the nervous system and bring on mental and physical bankruptcy. The habit of high-pitched and rapid conversation and the use of exaggerated language, the ready willingness to call oneself

"nervous," the very common and unjustifiable use of the terms nervousness and nervous prostration, all tend indirectly to debilitate the nervous system and pervert its action. The use of the term "nervous" as an excuse for failure to do one's duty is too common. So used, it means weak-mindedness, the loss of self-control. "Nerveless" is a better term which has been suggested for such cases.

The symptoms of neurasthenia are many and various. The individual may appear to be in perfect health, but frequently has a worried look. There may be irritability of temper, fatigue without adequate reason, poor sleep, with exhaustion on waking, headache, with sense of weight or constriction, impaired memory, want of appetite, constipation, various forms of muscular weakness, muscular tremors and contractions, an uncertain gait, a feeling of weariness, giddiness, pain along the spine (spinal irritation) and in the joints, hyperæsthesia, or paræsthesia (numbness and tickling), sexual emissions, and defects of sight and hearing. There is no capacity for sustained work. The recognition of mental and physical weakness causes the individual affected to become self-conscious, to distrust others, to have a feeling of isolation, to prefer solitude, to exaggerate trifling impressions, to dread the dark, and to suspect contamination from food, touch, etc.

Treatment of this obscure nervous disorder requires considerable time and the care of a kind but firm physician and nurse, who have the confidence of the patient. The co-operation of the patient should be elicited in the plans for recovery. If possible, the change from familiar scenes and surroundings, from the tumult and cares of city life to the country, to life in the open, in the woods, by the seashore or in the mountains, should be effected. Complete rest (see REST CURE), physical and mental, is the leading factor in the treatment. Travel, massage, electricity, induced sleep, carefully selected food, the removal of exciting causes, such as gout, lithæmia, and uterine disease, are all remedial and curative measures of importance in this affection.

**Neureuther, Eugen Napoleon**, German artist: b. Munich 13 Jan. 1806; d. there 23 March 1882. He began his studies at the Munich Academy, continued them at the Munich Academy, continued them at Paris (1830) and going subsequently to Rome (1838) fell under the influence of Cornelius (q.v.). In 1848 he was put at the head of the design department in the Royal Porcelain Manufactory at Nymphenburg, a position which he held until the sale of that establishment in 1856. He was engaged from 1868-77 as professor of design in the Royal Institution of Industrial Art. His brilliant versatility is shown in his skill as a house decorator, etcher, painter and industrial designer. He designed the border illustrations for Goethe's 'Ballads and Romances' (1829-40); he published 'Souvenir du 27, 28, 29 July 1830-1831'; and 'Bavarian Shepherd's Song with Illustrations' (1834). In 1835 he painted scenes from Wieland's 'Oberon' for the royal palace at Munich. For the *édition de luxe* of Herder's 'Cid' he produced 70 illustrations. His etchings after Mottmann's frescoes are admirable, and among his oil paintings are to be found in the Schack Gallery at Munich: 'Portia's Dream'; 'The Dying Nun'; 'The

Villa Mills'; 'The Villa Malta'; and a scene from 'Hermann und Dorothea.' He also furnished designs for the School of Industrial Art, and decorated the ceiling of the staircase and the cupola of the Polytechnique at Munich with grafito painting.

**Neuridine**, a ptomaine having the chemical formula  $C_8H_{11}N_3$ , which is formed during the putrefactive decomposition of flesh, appearing usually on the second day, and disappearing again on the fourth day. It also occurs in the fresh human brain, whence the name (Greek, "nerve"). Neuridine is a non-crystalline substance with an offensive odor, readily soluble in water, but insoluble in alcohol and in ether. According to some authorities it is intensely poisonous, while according to others it is not at all poisonous when pure.

**Neurine, Choline, or Sincaline**, a basic chemical substance having the empirical formula  $C_8H_{11}NO_3$ , or the constitutional formula  $(CH_3)_3C_2H_4.OH.NOH$ . It occurs in putrefying flesh, in the fly agaric, in ergot, in beet-root juice, and in the actively-growing parts of numerous plants. It may be prepared by boiling pigs' bile or ox-brain with baryta. Neurine is a syrupy body with markedly basic properties and a strongly alkaline reaction. It is poisonous, and may be converted by oxidation into muscarine (q.v.), to which substance the poisonous qualities of the fly agaric are commonly ascribed.

**Neuritis** (N. Lat. from Greek *νεῦρον*, nerve + *itis*, a suffix denoting inflammation), inflammation of a nerve. Multiple neuritis is the inflammation of several nerves together. Varying with the cause, neuritis is traumatic, gouty, leprosy, endemic, alcoholic, etc. The disease may be acute or chronic, primary or secondary. It results from an inflammation, swelling, and thickening of the nerve-sheath and its prolongations. They may be associated with inflammatory and degenerative changes of the substance of the nerve. The principal symptoms of the disease are persistent burning pain, more or less severe, and a tenderness in the course of the nerve and at the points of its distribution. These are followed by or associated with muscular weakness or paralysis, numbness—loss of sensibility or hyperæsthesia—and atrophy of muscles. The causes of the disease are various; for example, injury to a nerve, as in dislocations and fractures; extension of inflammation from a neighboring part; poisoning by lead, arsenic, mercury or alcohol (see Poisons); gout, syphilis, cancer, diphtheria, and infection. The simpler forms of the disease are usually recovered from, under treatment, in a few weeks, although recovery may be imperfect. In severe forms death may occur in from a week to ten days, from paralysis of the inspiratory muscles, or after several weeks from exhaustion due to continuous pain and bed-sores.

**Neuroglia**, the connective tissue found in many parts of the nervous system, differing very materially in its general structure from that found in other organs, wherefore it has received its special name. It is also sometimes designated as spider-cells, because of the many-branched processes which the cells possess.

**Neurology**, that branch of science which treats of the structure and functions of the nervous system. It deals with that system under

## NEURON — NEUTRAL NATION

all its aspects of form and condition, both in health and in disease, but especially with its pathological states, its hygiene, and its medical treatment. See **NERVOUS DISEASES**; **NERVOUS SYSTEM, EVOLUTION OF THE**; **NERVOUSNESS**.

**Neuron.** See **NERVOUS SYSTEM, EVOLUTION OF THE**.

**Neuropt'era**, the order of "nerve-winged" insects, so-called by Linnæus from the abundant supporting rods or "nerves" which ramify in a network throughout the wings. Since its establishment the original largely artificial group has been much restricted by the separation from it of large divisions. Typical *Neuroptera* have two pairs of large, equal, richly netted-veined, membranous wings, strong biting jaws, conspicuous, many-jointed antennæ, a free prothorax and a complete metamorphosis. This order is of relatively slight economic importance, but the eight or ten families include many common and interesting American insects. See **ANT-LION**; **CORYDALIS**; **DOBSON**; **LACEWING**; etc.

**Neuro'sis** (Greek *νῆρσις*, nerve), an affection of the nervous system indicated by disordered sensation, volition, or mental expression, without any recognized lesion of parts, and sometimes without a discoverable adequate cause. Many abnormal conditions are now considered as neuroses; some of them result from nervous dyspepsia, shown by belching and eructation, by spasm and atony of the stomach, due to increased or decreased peristalsis, etc. Cardialgia and cardiospasm (functional disturbances of the heart) may produce such conditions. They are variously described, and include accident-neurosis, a neurosis following a severe injury; traumatic neurosis, following a severe wound; cyclist's neurosis, following excessive bicycle-riding; alcoholic neurosis, due to overuse of alcoholics; occupation-neurosis (see **OCCUPATION, HYGIENE OF**), indicated by spasmodic manifestations when attempting to perform movements peculiar to the employment of the individual, as the cramps of writers, milkers, etc.; and angioneurosis, a neurosis of the blood-vessels of a part. Herpes zoster is spoken of as a vasomotor neurosis, an exanthematous angioneurosis.

**Neuro'tic.** As an adjective, this term signifies having relation to the nerves. Physicians speak of neurotic individuals or subjects, neurotic ulceration, neurotic poisons, etc. As a noun the term was formerly chiefly applied in medicine to any substance—drug or poison—which acts especially on the nervous system, neurotics being classified as cerebral (morphine, etc.), cerebro-spinal (as aconite), and spinal (as strychnine). This use of the word neurotics has become obsolescent, and the term is now mainly reserved for sufferers from nervous disease or excessive nervous activity.

**Neuzatz**, noi'zäts, or **Ujvidek**, ooy'vê-dâk, Hungary, a town in the district of Bács, on the Danube, opposite Peterwardein. During the civil war in 1849 it was stormed and taken by the imperial troops under Jellachich, and almost destroyed by the fire of the insurgents from the castle of Peterwardein. It was rebuilt and is now a thriving trading and educational centre. Pop. (1900) 29,296.

**Neuse**, nûs, a river of North Carolina, which has its rise in the north central part of

the State and flows southeast into the Atlantic through Pamlico Sound. Its mouth is an estuary about 30 miles long, and is 10 miles wide at its mouth. It is about 310 miles long and navigable for about 100 miles. A number of streams flow into the Neuse but it has no large tributary.

**Neusiedler See**, noi'zêd-lêr-zâ, Hungary, a lake in the northwest, between the counties of Ödenburg and Wieselburg, 30 miles southeast of Vienna. Its greatest length, north to south, is 23 miles, average breadth five miles, circuit about 60 miles. It is saline and shallow, its greatest depth seldom exceeding 15 feet; on the east side it is lost in the great morass of Hanság. Large quantities of salt crystallize on its shores in summer, consisting of a mixture of common and of Glauber salt. It contains abundance of fish, such as carp and pike, some of the latter being 70 or 80 pounds weight. Its frequent inundations occasioned great damage, till a canal was cut in 1800, to carry off its superfluous waters and discharge them into the Little Raab. The water several times has disappeared almost entirely. The last occasion was between 1865 and 1870, when crops were grown on its bed.

**Neuss**, nois, Germany, a town of the Prussian Rhenish province, on the Erft, near its junction with the Rhine, 21 miles northwest of Cologne. It has several fine churches, that of Saint Quirinus founded in 1209 being a notable transitional specimen from the Round to the Pointed style. The numerous industrial establishments include flour and oil mills, iron foundries, machine works, woolen and cotton factories, paper mills, etc.

**Neustadt**, noi'stât, or **Wiener-Neustadt**, vê'nêr-noi'stât, Austria, a town near the Hungarian frontier, on the Kerbach, 13 miles by rail, and by canal, south of Vienna. It retains its mediæval walls, and is dominated by the 13th century Babenburg ducal castle, now a military academy, and noted for its richly decorated Gothic chapel (1460), the burial place of Maximilian I. Locomotives and machinery, sugar, woolens, cottons, ribbons, starch, leather, pottery, wire, etc., are among the manufactures. The city was founded in 1192, and was rebuilt after the great fire of 1834.

**Neustria**, nûs'trî-a, or **West France**, the name given in the times of the Merovingians and Carolingians, to the western portion of the Frankish Empire, in contradistinction to Austrasia (q.v.), the eastern portion, the term being derived from *ne* (not) and *Austria*. The division took place at the death of Clovis in 511. Neustria lay between the Meuse, the Loire, and the Atlantic Ocean; after the cession of the northwestern portion to the Normans in 912, the name was applied to Normandy but soon fell into disuse. See **FRANCE**.

**Neuter**, a term formerly applied in zoology to those animals—represented chiefly among the *Hymenoptera*—in which the characteristics of sex are either present in a rudimentary condition or may not be developed at all. They are infertile females. Their status is given in the accounts, in this work of ants, bees, wasps and termites.

**Neutral Nation**, an American Indian tribe of the Iroquois family, formerly residing on the

## NEUTRAL SALTS—NEUTRALITY

north shore of Lake Erie. The French called them the Neutral Nation because they took no part in the long war between the Hurons and the Iroquois. The Hurons afterward made war on the Neutrals and utterly destroyed them.

**Neutral Salts.** See SALTS; NEUTRALIZATION.

**Neutral Tint**, in art, a pigment used in water-colors, of a dull-grayish hue partaking of the character of none of the bright colors. It is prepared by mixing together blue, red, and yellow in various proportions.

**Neutrality**, in international law, a term applied to the status of a state which maintains an attitude of non-interference in respect to an existing war between other states, rendering neither aid nor service to either belligerent in his military operations. The doctrine of neutrality constitutes a large and increasing part of the existing body of international law, but in ancient and mediæval times it occupied almost no place. Grotius, in the first important treatise on international law ever written, gave but an insignificant place to the subject, whereas in any modern treatise it occupies a place hardly second to any. Among the states of the ancient world the status of neutrality hardly ever existed. War rather than peace was the normal state of mankind and when it existed practically all nations participated either as principals or allies. If one nation undertook to pursue a neutral policy it had few rights as such which any of the belligerents felt bound to respect and consequently it was more often to its advantage to choose an able ally as a means of self-protection rather than to remain neutral.

It was among the flourishing maritime states of the Mediterranean region, during the later Middle Ages, that the modern doctrine of neutrality had its origin, and the first recognition of neutral rights was embodied in a famous maritime code, the "Consolato del Mare," which declared that the goods of a neutral were exempt from capture although found on an enemy's vessel. This wise and liberal rule in time came to be adopted by all the European powers and continued as a generally accepted principle of maritime warfare until superseded by the more liberal rule embodied in the Declaration of Paris of 1856. By the latter declaration, which was acceded to by all the nations of Europe and America except Spain, the United States and Mexico, the principle that free ships make free goods was adopted, that is, the goods of an enemy (contraband of war excepted) under a neutral flag, and neutral goods (contraband excepted) under an enemy's flag, are free from capture. The United States refused to give its adhesion to the declaration for the reason that it was disinclined to surrender the right of privateering, the abolition of which was also one of the provisions of the declaration. The United States assumed this position chiefly because of the smallness of its navy and the consequent disadvantage it would suffer in a war with the larger powers were it prohibited from increasing its naval strength by accepting the service of privateers. The government, however, proposed to become a party to the declaration provided a clause were added exempting private property from capture at sea the same as on land but it

was never done and the United States has never formally given its adhesion. But as a matter of practice it has observed the rules of the declaration quite as scrupulously as if it had been one of the signatory powers.

Several forms and gradations of neutrality are or were formerly recognized. It may be *qualified*, as where the neutral state is bound by an anterior agreement to furnish one of the belligerents a contingent of troops or a sum of money; or *absolute*, as where the state abstains wholly from interference on the side of either belligerent; or *perpetual*, as in the case of Belgium and Switzerland, whose neutrality and inviolability have been guaranteed by the powers upon considerations which have to do with the preservation of the balance of power among European states; or *armed* as where several neutrals unite for the purpose of enforcing by armed intervention their views of neutral rights as against the aggressions of belligerent powers. The most notable examples of such alliances were the armed neutralities of the Baltic powers in 1780 and 1800 for the purpose of enforcing against England the neutral doctrine that "free ships make free goods." It should be said that international law no longer recognizes the right of a state to maintain a qualified neutrality. If it is under prior treaty obligation to furnish one of the belligerents with men, money or ammunition, however trifling the quantity, it becomes an ally as soon as it undertakes to carry out the treaty stipulations and is no longer entitled to be treated as a neutral.

The obligations and rights of neutrals are determined by the usages of international law, not by those of municipal law. In this connection it should be observed that in judging of the violation of neutral duties a distinction is made between the acts of a state and those which are individual in character. The act of an individual therefore in supplying a belligerent with arms or ammunition would not be considered as a violation by the state of its neutral duties, although it might be a violation of municipal law. It is not sufficient that the neutral treat each belligerent with impartiality; he must abstain from giving aid to either except where the ordinary dictates of humanity require. He must not lend either belligerent money, furnish him with troops or ships of war or any article susceptible of warlike use, or allow his territory to be made the basis of hostile operations or for the organization and equipment of hostile expeditions, or as a recruiting ground for the enlistment of troops, or allow prizes to be brought into his ports and there adjudicated, or allow his subjects to aid in the preparation or organization of a hostile expedition against a friendly power. In the three rules adopted by the Geneva Arbitration Tribunal in the case of the *Alabama* Claims (q.v.) it was declared to be the duty of neutral governments to use due diligence to prevent the fitting out and departure of such expeditions from their territory, to prevent their ports from being made use of by either belligerent for hostile purposes; and to exercise the same diligence in respect to all persons within their jurisdiction in order to prevent any violations of the foregoing duties. On the other hand, it is not a violation of neutral duty to discharge the duties of humanity to either belligerent as by

## NEUTRALIZATION — NEUVILLE

allowing a belligerent vessel in distress to seek shelter in the neutral's port for the purpose of obtaining supplies or undergoing repairs or by furnishing asylum to a defeated and fugitive belligerent force. Nor is it at international law a violation of neutral duty when the subject of a neutral government in the ordinary course of trade sells to a belligerent firearms or other supplies which the latter may wish to buy. Likewise he may transport by ship to belligerents whatever they may want, subject, of course, to the right of the other belligerent to capture and confiscate such articles as may be deemed contraband of war. These are legitimate acts of trade unaffected by war, and neutral governments are not expected to interfere with them or assume responsibility therefor. Finally it is not a violation of neutral duty for one state to recognize the belligerency of another state at war or of a part of a state in rebellion against the established government. Nor is it a violation of neutral duty to recognize the independence of a revolted people when the revolt has reached such a stage as to give reason to believe that the revolutionists will establish their independence as a fact and maintain it.

The above enumeration of the duties of neutrals indicates in a rough way the *rights* which belligerents are bound to respect in the conduct of their warlike operations. They may be comprehended under the general head of complete immunity from the acts of either belligerent within their jurisdiction. No act of hostility may be committed by either belligerent within neutral territory nor within its territorial waters. Fugitive troops fleeing from an enemy may not be pursued in neutral territory nor may an armed vessel pursue and capture an enemy's vessel in neutral waters. As a means of enforcing its neutral obligations it is customary for states to enact *neutrality laws*, so called, making it criminal for their citizens or subjects to do certain specified acts which are considered to be violations of neutral duties, but such laws neither increase nor diminish the responsibility of the state enacting them. Consequently the state cannot plead the insufficiency of such laws or inability to execute efficient laws, in extenuation of its offense if it fails to enforce its neutral obligations. The foundation of the neutrality policy of the United States was laid during Washington's administration when upon the outbreak of war between England and France, Washington after a thorough consideration of our obligations to France, under the treaty of 1778, issued a public proclamation announcing that the United States would remain neutral and warned all citizens of the United States to abstain from giving aid to either belligerent. In the year following, Congress passed a neutrality act which as modified in 1818, and again in 1828, constitutes in all essential particulars the neutrality law now in force. It makes it a misdemeanor for any citizen of the United States to accept or exercise a commission to serve a foreign power in a war against a state at peace with the United States; or to enlist or to induce another person to enlist or to go beyond the jurisdiction of the United States to enlist in such foreign service; or to fit out, arm or augment the force of any armed vessel to be employed in such service; or to provide the means for setting on foot any military expedition against a

friendly state. No belligerent vessel is allowed to provide itself with military supplies in the territory of the United States, and the President is authorized to use force to send out of our territorial waters any vessel not entitled to remain therein. The neutrality laws of Great Britain are embodied in the Foreign Enlistment Act of 1870 and besides provisions similar to those contained in the laws of the United States they contain detailed and stringent regulations designed to prevent the building or equipping in British jurisdiction of ships intended to be used in war against a friendly power.

See also articles on ALABAMA CLAIMS; GENEVA ARBITRATION; INTERNATIONAL LAW; PARIS, DECLARATION OF. For references consult authorities cited under INTERNATIONAL LAW.

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**Neu'traliza'tion**, in chemistry, the process by which a solution, originally acid or alkaline, is rendered neutral, or brought into a state in which it is neither acid nor alkaline. If the solution is originally alkaline, it is made neutral by the addition of an acid substance; and if it is originally acid, it is neutralized by the addition of an alkali. A solution of caustic potash, for example, is strongly alkaline, and turns red litmus paper blue almost instantly; but if hydrochloric acid is gradually added to it, the alkalinity becomes reduced in proportion to the quantity of acid added, until a state is finally attained in which the solution does not manifest either acid or alkaline properties, and does not affect the color either of red or of blue litmus paper. It is then said to be "neutralized," the neutralization being due to the fact that the potash has entered into combination with the acid to form a salt (potassium chloride) which is neither acid nor alkaline. If more acid is added than is required to effect precise neutralization, the excess renders the solution acid, and in order to make it neutral again, caustic potash or some other alkali must be added. It is often highly important, in chemistry, to effect the precise neutralization of a solution, and a method of quantitative chemical analysis, known as "volumetric analysis," is based upon the determination of the quantities of certain standard acid and alkaline solutions which must be added to the given solution, in order to precisely neutralize it. See CHEMICAL ANALYSIS.

**Neuville, Alphonse Marie de**, *âl-fôns mârê dè nè-vêl*, French painter: b. St. Omer 31 May 1836; d. Paris 20 May 1885. While he was for a short time the pupil of Picot, he must be considered largely a self-taught artist developing his talent under the direction of Delacroix. He made his first appearance as a battle painter with his 'Episode in the Crimean War' (1859), followed by 'The Trench of the Mamelon'; 'Zouave Guard' (Museum of St. Omer); 'The Battle of San Lorenzo in Mexico.' Meanwhile he was producing numerous illustrations for periodicals and for Guizot's 'Histoire de France.' He served as an engineer in the Franco-Prussian war and the second period of his artistic activity began. He tickled the vanity and boastfulness of his countrymen by depicting in his glowing and energetic canvases the French as chivalrous heroes, the Germans



## NEUVILLE—NEVADA

as brutal barbarians, and became the most popular war painter of 'Young France' and the artistic representative of Chauvinism. Among his works with this tendency are: 'Bivouac before the Village of Le Bourget' (1872, Museum of Dijon); 'The Last Cartridge at Balan' (1873, familiar through its many reproductions), and numerous others often photographed or engraved and thus widely distributed. He left many aquarelles and drawings which were eagerly bought up.

**Neuville, Jean Guillaume**, zhōn gē-yōm, BARON HYDE DE, French statesman: b. near Charité-sur-Loire, France, 24 Jan. 1776; d. Paris, France, 28 May 1857. He was educated at the Collège Cardinal Lemoine, Paris, and early became an active agent of the exiled Bourbon princes. In 1799 he interviewed Napoleon with the purpose to restore the throne to Louis XVIII., and later his estates were confiscated; but in 1806 upon his agreeing to exile himself to the United States, Napoleon refunded them. With the accession of Louis XVIII. in 1814 he returned to France and in 1815 was elected to the Chamber of Deputies. He was sent to the United States as minister and consul-general in 1816-21 and was then made ambassador to Portugal. In 1830 he became secretary of the navy. He wrote: 'An Historical Eulogy of General Moreau'; etc.

**Neva**, nē'vā (Russian, nyē-vā'), Russia, a river which flows from Lake Ladoga, and after a westerly winding course of 40 miles, has its outlet in the Bay of Cronstadt, an inlet of the Gulf of Finland. It is best known as the river on the delta of which St. Petersburg (q.v.) is built. The river carries to the sea an enormous volume of water from lakes Ladoga, Onega, Ilmen, and others; in places it is over 4,000 feet wide, elsewhere narrows to 180 feet, and at one or two points navigation is obstructed by reefs and rapids; it is frozen over during five months of the year. The Neva connects with the Volga by the Ladoga Canal, and thus joins the Baltic with the Caspian Sea.

**Nevada**, ne-vā'dā, **Emma**, stage name of EMMA WIXON, American opera singer: b. Austin, Nev., 1862. She studied in Paris with Marchesi and made her first appearance in opera in London in 1880, as Amina in 'La Sonnambula.' She sang with success in Paris, Italy, and in the United States, where she toured in 1885. In 1885 she was married to Dr. Raymond Palmer.

**Nevada**, popularly known as "the sagehen State" and "the sage-brush State," the name being derived from the Spanish, Nevada signifying "snow-covered"; one of the Pacific slope States of the Union and one of the most important from the standpoint of mineral wealth. Nevada is bounded on the west by California; on the south by California and Arizona; on the east by Utah and Arizona, and on the north by Oregon and Idaho. It has an area of 112,090 square miles; extreme length, north to south, 484 miles, and width, east to west, 321 miles. Nevada ranks fourth in size among the States of the Union. The capital is Carson City.

**Topography.**—The northern portion of the State lies in the Great American Basin, included between the Sierra Nevada on the west and the Wahsatch Mountains on the east. This basin

forms a plateau 4,000 feet above the sea. There are numerous parallel ranges from 20 to 50 miles apart, running north and south through the State, broken by passes and valleys. In the southwestern portion a few mountains are scattered over an alkali plain. Some of these ranges rise above 9,000 feet. The highest point in the State is Wheeler Peak, near the centre of the eastern boundary, with an altitude of 13,058 feet. Other lofty mountains are White Pine, Piñon, Trinity, Humboldt, Santa Rosa, Lookout, Antelope, Diamond, Granite, Shell Creek, Goshoot, Desert, Opal, and Quartz. The mountains of Nevada show formations of nearly every epoch, from the Azoic to the late Jurassic.

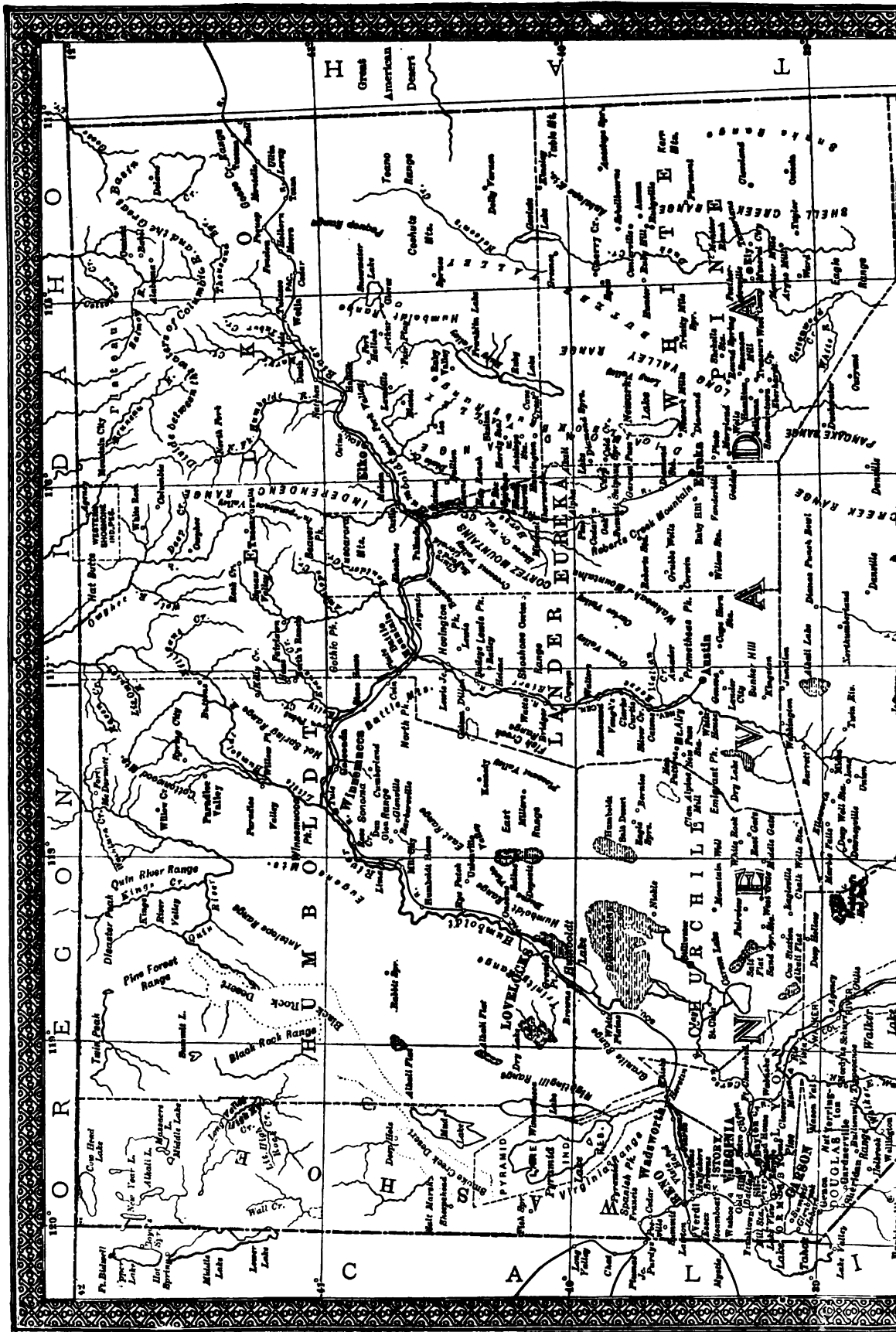
**Rivers and Lakes.**—The southwestern part of the State has no waterways. The principal river, the Humboldt, rises in the northeast and flows across the State to Humboldt Lake. Several rivers rise in the Sierra Nevada and flow into lakes in the west-central part of the State. These include Walker River, Carson River, and the Truckee River. Pyramid Lake is the largest lake in the State and measures 35 miles in length by 10 miles in width. Lake Tahoe lies on the western boundary at an altitude of over 6,000 feet. It is 21 miles long. There are also Mud Lake, Carson Lake, Walker Lake, and others. In the north is the Owyhee River, a tributary of the Columbia.

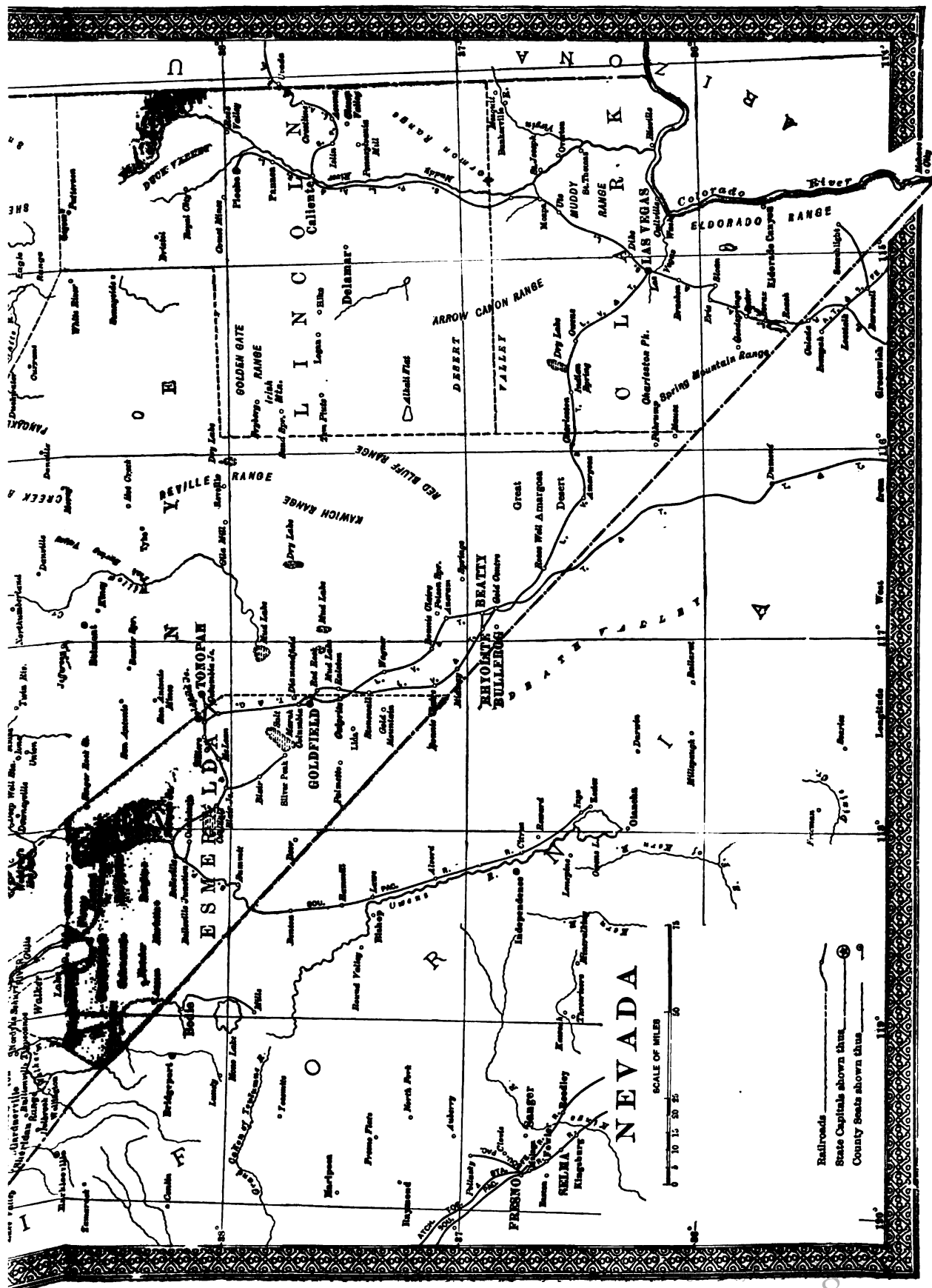
**Geology and Mining.**—The mountains and surface rocks are composed of limestone, calcareous spar, granite, syenite, porphyry, and slate. Volcanic rocks occur in various places, and in the northwestern part of the State there are extensive lava beds. The minerals include silver, gold, antimony, lead, copper, mercury, coal, and nickel, and also sulphur, gypsum, and deposits of salt and borax. The extensive deposits of gold and silver created the State and made it famous through the Comstock Lode (q.v.), which produced as much as \$39,000,000 in bullion in a single year. (See GOLD; SILVER.) The annual estimated coining value of the gold production is \$4,500,000; silver, \$4,000,000; the copper production was over 750,000 pounds, and the lead production over 4,000 short tons. The building stones include limestone, granite, slate, sandstone, agate, and marble. Amethysts, carnelians, and tourmalines are also found.

**Banking and Finance.**—In the State in 1909 there were 13 National banks in operation, having 2,395 depositors and \$1,165,114 savings deposits; 14 State banks, with 2,262 depositors and \$1,234,813 savings deposits; and 3 private banks. On 1 Jan. 1910 the total bonded debt of the State was \$550,000. The total assessed valuation in 1910 was \$73,856,142, divided as follows: real estate, \$50,482,256; personal property, \$23,373,885. The State tax rate is \$8.00 per \$1,000. It appears by the "Statistical Abstract" that in 1909 Nevada sent no report to the Comptroller on savings banks or loan and trust companies.

**Irrigation.**—Nevada became the scene of the first work performed under the Irrigation Law passed by Congress in 1902. Work was soon begun on what is called the Truckee dam, and the first contract called for an expenditure of \$900,000. The problem of irrigation has become the most prominent local question in Nevada, and the statement is frequently made that, with a greater supply and distribution of water, Nevada would eventually become one of









## NEVADA

the foremost agricultural States on the Pacific slope. Chief Hydrographer Newell of the Geological Survey predicts that Nevada will have a population of 500,000 people within 50 years.

**Agriculture.**—It is the scanty rainfall rather than the poverty of the soil that has given the impression that Nevada is a desert. Very nearly 90 per cent of the improved area is under irrigation, with astonishing results. In the cultivated valleys the crops include spring wheat, barley, oats, potatoes, and vegetables. The State is well suited for stock-raising, which is carried on to a large extent. The white sage brush affords the best of winter pasturage, and much hay is cut along the river bottoms and in the valleys. The breeding of Cashmere and Angora goats is carried on to a limited extent. In 1910 the State had 19,000 milk cows, 404,000 neat cattle, 98,000 horses, 3,000 mules, 1,585,000 sheep, and 15,000 swine. The forest trees are chiefly pines, firs, and spruces of great size. The foothills are covered with mountain mahogany, dwarf cedar, willow, beech, cottonwood, and wild cherry. Apple, peach, pear, and plum trees flourish and bear excellent fruit.

**Commerce and Industries.**—Upward of \$3,000,000 is invested in the various industries of the State, although there are no manufactures of any particular prominence, the industries being small and varied. This is due largely to a lack of railroad facilities, Nevada having a smaller mileage than any other State in the Union, which is only about 1,000 miles. The Southern Pacific, running east to west through the State, is the principal line with a few smaller or branch roads. In 1905 there were reported by the United States census 115 manufacturing establishments, employing \$2,891,997 capital and 802 persons; paying \$693,407 in wages, and \$1,627,776 for raw materials; and having an annual output valued at \$3,096,274. The principal articles of manufacture include railroad cars, dairy products, flour and grist, printed material, saddlery and harness, clothing, chemicals, boots and shoes, brick and tile, wagons and carriages, confectionery, liquors, lumber and timber products, and salt.

**Government.**—The State is governed by the original constitution of 1864. Suffrage is restricted to male citizens 21 years of age, who have resided in the State six months and the district or county 30 days. The number of members of both branches of the legislature cannot exceed 75. Assemblymen serve two years and senators four years. Both are elected on the Tuesday after the first Monday in November of even years. A governor, lieutenant-governor, secretary, treasurer, controller, surveyor-general, and attorney-general are elected at the same time and serve for four years. There are a supreme court, district courts, and justices of the peace. A system of county and township government is established by the legislature. The State maintains an orphans' home, at Carson; a hospital for mental diseases, at Reno; and a State penitentiary at Carson.

**Education.**—The children of school age in the State number about 10,000; the enrolment (1908) was 9,761; daily attendance 6,910; and the total number of teachers was 414. The public schools are maintained by State and local taxes and are in charge of a State Board of Education and three superintendents. Educa-

tion is compulsory. There are about 677 pupils in the high schools and over 250 in the Nevada State University (q.v.), a coeducational institution located at Reno, in connection with which the United States government has established an agricultural experiment station. The government also maintains a school for Indian children. The public school property is valued at about \$350,000. The annual expenditures amount to about \$260,000. For higher education there are public high schools at Austin, Carson City, Eureka, Gold Hills, Reno, Dayton, Wadsworth, Winnemucca, and Virginia City.

**Churches.**—The strongest denominations in the State are the Roman Catholic, Protestant Episcopal, Mormon, Methodist Episcopal, and Presbyterian. There are about 75 Evangelical Sunday-schools, with 1,000 officers and teachers, and 4,000 scholars.

**Political.**—Nevada, more than any other State in the Union, is largely controlled politically by local interests. It was counted as Republican up to 1892, when it cast its vote for the candidates of the People's Party. In 1896 it voted for free silver, in 1900 cast its vote for William J. Bryan for President, and in 1904 cast its 3 electoral votes for Roosevelt. The first and only Territorial governor was James W. Nye (1861-4). In the State elections Nevada has elected five Republican governors, two Democratic governors, two Silver Party governors, and one Silver-Democratic governor.

**History.**—Nevada was originally a part of California, known as "the Washoe Country," until it was organized as a Territory in 1861. It was first visited by the white man in 1775, when Francisco Garcés, a Franciscan friar, stopped here on his way to California. In 1825 Peter Ogden, of the Hudson Bay Company, visited the Humboldt River, which for a time was called the Ogden. In 1826 Jedediah S. Smith crossed the State from west to east. Fremont passed through the State in 1843-4-5, and occasional immigrants to Oregon or California settled here. In 1849 the Mormons founded a trading post on the Carson River, near Genoa. A part of the State was included in Utah Territory, when it was organized in 1850, but in 1853 the settlers in the Carson Valley petitioned to be annexed to California, claiming that Utah did not protect them. A petition for Territorial government was sent to Congress in 1857, and in 1858 a provisional government was formed at Carson City with Isaac Roop as governor. In 1860 another petition was sent to Congress and the Territorial delegate applied for admission. The Comstock Lode was discovered in 1859, and miners flocked into the district from the east and north and from California. At the outbreak of the Civil War the scanty population sent loyal troops to the front and Nevada citizens donated \$50,000 in silver bricks to the Sanitary Commission. In September 1863 an election was held for delegates to form a State constitution, but the proposition was defeated in January 1864. The political situation made two additional Republican votes in the United States Senate exceedingly desirable, and Congress, in March 1864, again passed an enabling act, in July the constitution was accepted, and the State was admitted 31 Oct. 1864. The great Sutro Tunnel (q.v.) designed for drainage and access to the mines of the Comstock Lode, was con-

## NEVADA — NEVIN

structed in 1879. The silver product of the State from 1859 to 1869 amounted to \$137,382,000, and this had much to do with gaining Nevada a place in the Union.

**Population.**—In 1883 Nevada at its zenith had a population of 66,265, including 3,152 Chinese and 4,000 Indians. In 1903 the population was about 40,000. The census for 1890 reported a population of 45,761, and in 1900 of 42,335. The decline of the mining industry of the State, and failure to develop in other directions, has caused the diminution of population. The recent development of the gold mines of the State, however, has caused a large and steady influx of miners and speculators, and several modern, well-built and prosperous towns, such as Tonopah, Goldfield (in 1907 made the county-seat of Esmeralda County), Rhyolite, and Manhattan, have sprung into existence since 1900 and are rapidly increasing both in size and importance. The State still has (in 1910) the fewest inhabitants of any of the States—81,875. The capital city is Carson; other large cities and towns are Reno, Virginia City, Elko, Eureka, Austin, Wadsworth, Delamar, Winnemucca, and those mentioned above.

**Nevada, Iowa,** city, county-seat of Story County; on a branch of the Chicago & Northwestern railroad; about 30 miles north by east of Des Moines. It is in an agricultural region in which stock-raising is a prominent industry. Its chief manufactures are flour, brick, tile, lumber and dairy products. It has a large cold-storage plant, and considerable trade in dairy products, poultry, eggs, grain, flour, and live-stock. The public library contains about 5,500 volumes. Pop. (1910) 2,138.

**Nevada, Mo.,** city, county-seat of Vernon County; on the Missouri, K. & T., and the Missouri P. R.R.'s; about 130 miles southwest of Jefferson City and 100 miles south of Kansas City. It was settled about 1830 by a colony from the eastern part of the State, incorporated in 1865 or 1866, and chartered as a city in 1883. It is in an agricultural and stock-raising region, and in the vicinity of the zinc mines. Its manufactures are chiefly local. The number of men employed in railroad shops and manufacturing establishments is about 1,000. The city has considerable trade in agricultural products and live-stock, and it is a distributing centre for a large part of Vernon County. Its educational institutions are public schools, Cottey College for Young Women, opened in 1884 under the auspices of the Methodist Episcopal (South) Church, and Saint Francis Academy (R. C.). It has an orphan asylum, the State Lunatic Asylum, and Artesian Lake Park. The three banks have a combined capital of \$250,000. The government is vested in a mayor and a council of 10 members, who hold office two years; five councilmen are elected each year. Pop. (1890) 7,252; (1900) 7,461; (1910) 7,176.

**Nevada State University,** first founded at Elko in 1873, then removed to Reno and opened in 1886. It is a part of the public educational system of Nevada and the only school of collegiate grade in the State. Besides the regular collegiate courses in the classics, literature and general science, there are courses in agriculture, civil, mechanical, and mining engineering, and domestic science; also a business course; a nor-

mal and a preparatory department. In the agricultural department short winter courses are offered in agriculture, dairying and domestic science. In 1901 a branch school of mines was established at Virginia City under the head of university extension. The State Experiment Station is also connected with the university. The degrees conferred are A.B. and B.S., with the corresponding masters' degrees for graduate work. Women are admitted and constitute fully half the number of students; military drill for the men is a part of the curriculum. As the agricultural department is connected with the university, it receives the income from the Federal land grants for agricultural colleges; the total income in 1910 amounted to \$210,000. The students numbered 280, and the faculty 40.

**Névé, nã-vã.** See GLACIER.

**Nevers, nê-vâr,** France, the capital of the former province of Nivernais, now of the department of Nièvre, picturesquely built on the slope of a hill 600 feet above sea-level, at the influx of the Nièvre to the Loire, 159 miles southeast of Paris. It was the Roman Noviodunum, and has been an episcopal see since 506; its 13th century cathedral has been restored since 1879; the 11th century Romanesque church of St. Etienne is interesting. The stately court-house, dating from 1475, was formerly the castle of the Dukes of Nevers. The city contains a fine public garden, a bridge of 14 arches over the Loire, a mediæval gateway, housing a museum of Gallo-Roman antiquities, and a triumphal arch (1746) commemorating Fontenoy. The industries comprise the manufacture of cannon, iron cables and chains, porcelain (introduced by Italians about 1565), etc. Pop. about 30,000.

**Nev'ersink Highlands.** See NAVESINK HIGHLANDS.

**Neville, nêv'îl, Henry,** English actor: b. Manchester 20 June 1837; d. 19 June 1910. He achieved great success on the London stage, where he first appeared in 1860, and later took the chief rôle in 'The Ticket of Leave Man.' He was lessee of the Olympic in 1873-9, and established a dramatic school in 1884. Besides plays, such as 'The Duke's Device' and 'The Violin-Maker,' he wrote 'The Stage: Its Past and Present'; 'Gesture' (in Campbell's 'Voice, Speech, and Gesture,' 1895).

**Neville, Richard,** earl of Warwick. See WARWICK, RICHARD NEVILLE, EARL OF.

**Neville's Cross, Battle of.** See BRUCE, DAVID.

**Nev'in, Ethelbert Woodbridge,** American composer: b. Edgeworth, Pa., 25 Nov. 1862; d. New Haven, Conn., 17 Feb. 1901. He obtained his musical education in Pittsburg and in Berlin and after three years spent in the latter city returned to the United States and opened a studio in Boston. He appeared in public occasionally but his reputation rests chiefly upon his compositions which date from his 12th year. 'Narcissus,' which has a world-wide popularity, was written when he was 13, and 'O, that we Two were Maying' a year later. Other compositions are: 'A Day in Venice'; 'Cradle Song'; 'Milkmaid's Song'; etc.

**Nevin, John Williamson,** American Reformed (German) clergyman: b. Shippensburg,

## NEVIN—NEW BEDFORD

Pa., 20 Feb. 1803; d. Lancaster, Pa., 7 June 1886. He was graduated from Union College, Schenectady, N. Y., in 1821 and from Princeton Theological Seminary in 1826, where he remained for a few years as tutor. He was professor of Hebrew at the Presbyterian Theological Seminary at Allegheny City 1829-39, became president of the Mercersburg Theological Seminary in 1840 and was president of Marshall College 1841-53. His translation of Schaff's 'The Principle of Protestantism' created the once famous controversy over 'Mercersburg Theology' (q.v.), of which he was for the rest of his life the principal advocate. He edited the *Mercersburg Review* 1849-53, resigned from the presidency of the Seminary in 1851 and from Marshall College in 1853. In the last named year the college was removed to Lancaster, Pa., and merged with Franklin College, Dr. Nevin serving as president of Franklin and Marshall College (q.v.) 1866-76. He published 'The Mystical Presence' (1846); 'The History and Genius of the Heidelberg Catechism' (1847); 'Antichrist or the Spirit of Sect and Schism' (1848).

**Nevin, Robert Jenkins**, American Episcopal clergyman: b. Allegheny, Pa., 24 Nov. 1839; d. Mexico City, Mexico, 20 Sept. 1906. He was a son of John Williamson Nevin and was graduated from Franklin and Marshall College, Lancaster, Pa., in 1859; he served through the Civil War in the Union army, attaining the rank of brevet-major. He was ordained in 1867 and from 1869-96 was rector of St. Paul's American Church in Rome which he built in 1870-6. He wrote: 'St. Paul's within the Walls' (1878); 'Reunion Conference at Bonn' (1875); etc.

**Nevins, Winfield Scott**, American journalist: b. Brunswick, Maine, 6 Dec. 1850. He has been connected with the *Boston Herald* for 30 years and was president for four years of the school board of Salem, Mass. He has published 'Old Naumkeag' (with Webber) (1878); 'Guide to North Shore of Massachusetts' (annually, 1880-96); 'The Intervale, New Hampshire' (1887); 'Witchcraft in Salem Village' (1892).

**Nevinson, Henry W.**, English journalist. He was a war correspondent of the *London Daily Chronicle* during the Græco-Turkish war of 1897, and also from the Transvaal and Natal during the Boer war in 1899. He has published 'Life of Schiller' (1889); 'Neighbors of Ours' (1895); 'In the Valley of Tophet' (1890); 'The Thirty Days' War' (1898); 'Ladysmith' (1900); 'The Plea of Pan' (1901).

**Nevis**, West Indies, one of the Leeward Islands, belonging to Great Britain, two miles southeast of Saint Christopher, with which, since 1882, it is administratively connected. It is circular in form, rises in the centre to a wooded ancient crater (3,200 feet), and has an area of 50 square miles. The lower slopes are cultivated, the sugarcane being the principal crop; limes and oranges are grown to a small extent. The capital is the port of Charlestown. Nevis was discovered by Columbus in 1498 and colonized by England in 1628. In the 18th century it was twice taken and restored by the French. Pop. about 15,000.

**New, Clarence Herbert**, American author: b. New York 1862. He was educated at the

Polytechnic Institute of Brooklyn, and engaged in travels which took him all over the world. In 1886-92 he was a constructing engineer and became lieutenant of naval volunteers in 1891-3. Since 1898 he has been a publisher. He has written: 'Franc Elliot' (1894); 'Chronicles of Murphy's Gulch' (1898); etc.

**New, John Chalfant**, American financier: b. Vernon, Ind., 6 July 1831; d. 4 June 1906. He was graduated from Bethany College, Va., in 1851 and studied law, becoming clerk of Marion County in 1856. In the Civil War he served as quartermaster of Indiana until his election to the State senate in 1862. He was cashier of the First National bank of Indianapolis in 1865 and later its president. He was United States treasurer in 1875-6 and served as assistant treasurer in 1882-4. He was appointed consul-general at London in 1889 by President Harrison and was proprietor of the *Indianapolis Journal*.

**New Albany, Ind.**, city, county-seat of Floyd County; on the Ohio River, and on the Baltimore O. & S., the Pittsburg, C. C. & St. L., the Louisville, E. & St. L., and the Louisville, N. A. & C. R.R.'s; nearly opposite Louisville, Ky., and about 110 miles south of Indianapolis. It was laid out for a city in 1813, and in 1839 was incorporated. It is two miles below the falls in the Ohio River (See LOUISVILLE) and has extensive water-power. Its chief manufacturing establishments are large glass works, pork-packing establishments, tanneries, engine and boiler works, furniture factories, flour mills, rolling mills, lumber and planing mills, and foundries. It has a large trade in its manufactures, the farm products of Floyd County, and in building material. Some of its prominent buildings are the government building, the city-hall, courthouse, fair-ground buildings, the churches, and the schools. It is the seat of De Pauw College for women, Saint Mary's Academy (R.C.), Holy Trinity Academy (R.C.); it has public and parish schools and a free public library. Outside the city limits is a National cemetery in which are 2,908 graves, 676 of unknown dead. The government is administered under the charter of 1839 and provides for a mayor, who holds office four years, and a council. Some of the administrative officials are appointed by the mayor and the others are elected by the council. Pop. (1910) 20,629.

**New Albion**, the name given by Sir Francis Drake, in 1579, to the coast of North America. Humboldt and later writers restricted the name to the region between San Francisco and what is now the northern boundary of the State of Oregon.

**New Amsterdam**. See NEW YORK.

**New Archangel**. See SITKA.

**New Atlan'tis**. See ATLANTIS.

**New Bedford**, Mass., city, port of entry, one of the county-seats of Bristol County; on the Acushnet River and New Bedford Harbor, an arm of Buzzard's Bay; and on the New York, New Haven & Hartford railroad. It is connected with Fall River, Brockton, Onset, and Dartmouth by electric lines, and by steamers with New York, Martha's Vineyard, and other places, and is 56 miles south of Boston. It was settled in 1652 by John Cook and others from Plymouth, and was a part of Dartmouth until



## NEW BRAUNFELS—NEW BRIGHTON

it was incorporated in 1787; chartered as a city in 1847. It was once noted for the number of its inhabitants engaged in the whale fisheries, but since 1860 its whaling interests have decreased and its manufacturing industries increased. The town occupied a prominent place in the Revolution, especially in sending out privateers which harassed the enemy and captured many of the British vessels. On 5 Sept. 1778 the town was attacked by a British fleet, captured and almost destroyed. The harbor is protected by Fort Rodman, on Clark Point. A large lighthouse is on Palmer Island at the entrance of the harbor. The area of New Bedford is nearly 20 square miles. It is well laid out, the streets are clean and nearly all paved. Fine roads along the shore, good views of the sea, opportunities to go out into the country on electric cars, all add to the attractiveness of the city which is now a most important manufacturing centre. The chief manufacturing establishments are 41 cotton mills (1904), representing a capital of \$24,000,000, and having 1,603,080 spindles and 16,000 employees; the Twist Drill Company, 500 employees; cordage works, 400; one of the large shoe factories has 500 employees; woolen mill, 200; glass works, 300; paint works, 500; and 50 other industries, all giving employment to thousands of people. In 1902 New Bedford received 215,000 bales of cotton, new cotton mills were erected, and the old mills enlarged. New Bedford ranks first of the cities of the United States in the manufacture of fine cotton goods and fine cotton yarns, and second in the number of spindles. The total number of building-permits granted during 1902 was 470, at an estimated cost of \$2,000,000. The city has an extensive trade; its manufactured articles are exported to nearly all parts of the world. The coal received at its docks (1904) amounts to over 600,000 tons annually, and it is a distributing centre for large quantities of food products which are brought from other parts of the United States and from other countries. Among the prominent buildings are the government building, the city-hall, county court-house, the Merchants' National Bank, Masonic and Odd Fellows' buildings, Saint Luke's Hospital, Saint Mary's Home for Aged and Orphans, and a State Armory. The public parks have a combined area of about 260 acres. The bridge which spans the harbor and connects Fairhaven and the east side with the city cost \$1,500,000. The educational institutions are 30 public schools, five parish schools (R.C.), the Swain Free School, a State Textile School, a kindergarten (R.C.) and a public library which contains about 74,000 volumes. This library was founded in the early part of the 19th century, but did not become a municipal institution until 1856. There are 50 churches several of which are fine buildings. The national and trust company banks have a combined capital of \$2,800,000; the savings banks have deposits (1903) amounting to \$22,161,694.

The government is administered under the revised charter of 1896 which provides for a mayor, elected annually, a board of aldermen and a council. There are 6 aldermen and 24 members of the council, 4 from each ward. The mayor appoints, subject to approval of the board of aldermen, the license and the park commissions and the board of health. The council

elects the officers of the fire department, the overseers of the poor, and the water board. There are two sources of supply of water, one opened in 1869, the other in 1899. The whole cost the city about \$3,150,000. The water of the first plant is now held in reserve for emergencies, and great precautions are taken to have an uninterrupted flow of water in case of fire. There are now about 110 miles of water mains. The annual municipal expenditures for maintenance and operation are about \$1,010,000. The chief items of expense are, for schools, \$236,000; for police department, \$114,000; streets, \$71,000; fire department, \$81,000; charitable institutions, \$75,000; lighting, \$50,000; interest on debt, about \$150,000. There is a large foreign element, chiefly French Canadian, in the city, but all who have made permanent homes here are becoming American. The nationalities represented (1 Jan. 1904), are about as follows: French Canadian, 15,000; Portuguese, 12,000; English, 10,000; German, 2,000. The total population (1890) 40,733; (1900) 62,442; (1910) 96,652, an increase of 54.8 per cent.

Consult: Rickeston, 'History of New Bedford'; 'Centennial in New Bedford.'

G. A. HOUGH,  
Editor, 'Evening Standard.'

**New Braunfels**, brown'fēlz, Texas, city, county-seat of Comal County; on the Guadalupe River, at the mouth of the Comal, and on the Missouri, K. & T., and the International & G. N. R.R.'s; about 50 miles southwest of Austin, the capital, and 30 miles northeast of San Antonio. The short stream called Comal River has its source in artesian springs, and furnishes the city industries with an extensive volume of water. It is in a productive agricultural region in which stock-raising is given considerable attention. The chief manufacturing establishments are large flour mills, tannery, brick works, wagon factory, and cottonseed-oil mills. The trade is chiefly in wheat, flour, cotton, and live-stock. The inhabitants are nearly all Germans or of German descent. Pop. (1890) 1,608; (1900) 2,097; (1910 est.) 2,200.

**New Brighton**, brī'tŏn, Pa., borough, in Beaver County; on the east bank of Beaver River; two miles from its junction with the Ohio, and on branches of the Pennsylvania and the Pittsburg & L. E. R.R.'s; 28 miles northwest of Pittsburg. It was settled in 1799 by the laborers employed to build Wolf's mill,—a flouring mill; laid out in 1818, and incorporated as a borough in 1838. Coal-fields and fire-clay beds are in the vicinity. It is in a section of the State in which manufacturing and industries connected with coal are prominent. The good water power furnished by Beaver River is utilized in a number of manufacturing, chief of which are potteries, coffee mills, flour mills, wire, rivet, and nail factories, brick and sewer pipe works, twine factory, iron enameled bath tub works, fire-engine, keg, and brass casting works. There are about 1,000 employees in the manufacturing establishments. There are 10 churches, 12 public schools, and one parish school. It has the Beaver Valley General Hospital, a public art gallery and library, and a park. The three banks have a combined capital of \$1,150,000. The government is vested in a burgess and a council of 12 members. About three fourths of

## NEW BRIGHTON—NEW BRUNSWICK

the population are native born Americans. Pop. (1910) 8,320.

**New Brighton.** See RICHMOND, BOROUGH OF.

**New Britain,** brit'n, Conn., city, in Hartford County; on the New York, N. H. & H. railroad; about 11 miles southwest of Hartford. It was settled in 1687 and remained a part of Berlin until 1850 when it was incorporated as a town. In 1871 it was granted a city charter. It is in an agricultural region, but is noted for its extensive manufacturing interests. The chief manufactures are: stamped ware, hardware, foundry and machine-shop products, knit goods, hosiery, and cutlery. The trade is chiefly in the manufactured goods, but it is a distributing centre for quite a number of the nearby villages. It has a park, area, about 80 acres, well-kept streets, and a large number of fine church buildings. It is the seat of a State Normal School and the New Britain Institute; it has good public and parish schools.

The revised city charter of 1896 provides for a mayor, who holds office two years, and a council. Some of the administrative officials are appointed or elected by the mayor and council. The sheriff, city clerk and assistant, collector, treasurer, and auditor are elected by popular vote. The town elects the school board. The city owns and operates the waterworks. Elihu Burritt (q.v.) was born in New Britain and lived here nearly all his life. Pop. (1890) 16,519; (1900) 25,998; (1910) 43,916.

**New Britain.** See NEW POMERANIA.

**New Brunswick,** Canada, a maritime province, lying mainly between the 45th and 48th degrees of North Latitude and the 64th and 68th degrees of West Longitude. It is bounded on the south by the Bay of Fundy, on the east by the Straits of Northumberland and Gulf of Saint Lawrence, on the north by the Bay of Chaleur and the Province of Quebec, and on the west by the State of Maine. The length of the Province from north to south is 230 miles and its greatest breadth 190 miles; and it has an area of 27,985 square miles and a sea coast of about 600 miles.

**Topographical Features.**—Being a portion of the continent it resembles in its topographical features and climate the adjoining portions of Quebec and New England. It is a rolling country of no great elevation and its loftiest hills are in the northern and northwestern sections of the Province and are an extension of the Appalachian mountains. The scenery is picturesque and varied but a large portion of the centre of the Province consists of one vast forest.

The most marked feature of the eastern highlands of New Brunswick is a ridge of hills almost continuous from Maine to the Saint John river in Queens county, and eastward through Kings county ending in Butternut ridge. This ridge rises 800 or 900 feet above the surrounding country and includes some high peaks, Prospect mountain, and Eagle mountain near the Nerepis river, Mt. Pleasant, Mt. Porcupine and Red Rock mountain in Charlotte county, and Ben Lomond in the county of Saint John. This ridge runs parallel to the coast and is cut through in many places by rivers which

flow into the Bay of Fundy east of the Saint John river. There are also five parallel ridges running in an easterly direction and rising to an average of a thousand feet with valleys between. The highest of these ridges skirts the Bay of Fundy and contains Bloomsbury mountain and the Quaco hills. It divides into two or more ridges in Albert county, in Caledonia mountain and Shepody mountain, the latter being 1,050 feet high. The triangular area of sandstone of the carboniferous period presents a comparatively level surface nowhere rising above 800 feet, the general level especially in the eastern part of the Province being below 300 feet. The highest land of the Province is in the northern highlands. West of the Saint John river, in York and Carleton counties, it rises into several peaks and ridges to a height of 800 or 900 feet, while the general level is about 500 feet. East of the Saint John river the land rises to the watershed dividing the Tobique and other tributaries of the Saint John from the rivers which flow eastward. Mountains and broken ranges cross this tract of land in all directions and reach the Saint John valley in the vicinity of Mars hill, which is 1,688 feet in height.

The coast line of the Bay of Fundy is rocky and bold and indented with several fine harbors, the principal ones being Saint John, Letang, and Saint Andrews. On the Bay of Chaleur and Gulf of Saint Lawrence, the shore is less rugged and the harbors are not so deep.

**Hydrography.**—Few countries are so well watered as New Brunswick. Lakes are numerous and there are many rivers and streams, some of them of large size. The Saint John, which flows into the Bay of Fundy, is 450 miles in length and drains 26,000 square miles of territory. Some of its tributaries are upwards of 100 miles in length. Other large rivers are the Miramichi and Restigouche—which are each upwards of 200 miles in length—the Peticodiac and the Saint Croix.

**Soil.**—The Province presents a considerable diversity of soil. At its southern boundary there is a belt about 30 miles wide along the coast of the Bay of Fundy composed of granite and crystalline rocks, which are much disturbed and thrown up into ridges. North of this belt lies a large part of Sunbury, Westmorland, Albert and Northumberland counties, and the whole of the county of Kent. The western area of this limits is in York county, west of Oromocto lake, while its southern boundary extends to near the mouth of the Peticodiac river and the northern boundary goes as far as Bathurst. Northwest of this sandstone area the rocks are principally slate and limestone with large deposits of granite appearing in different places. These rocks are much disturbed and are thrown up at various angles forming high ridges and lofty peaks. The sandstones which occupy the middle and eastern part of the Province are the newest rocks in New Brunswick. They belong to what is called by geologists the carboniferous period, because deposits of coal are found in them. The rocks lie for the most part flat, or are spread out layer upon layer on the shores and bottoms of ponds and lakes in the form of clay, sand, and gravel, carried down by streams and rivers and hardened, after the lapse of ages, into solid rock.

## NEW BRUNSWICK

**Minerals.**—New Brunswick is inferior to Nova Scotia in respect to mineral wealth, but it possesses some valuable ores and abounds in excellent stone. Coal is found in the southern portion of the Province at many points and is being worked at Grand Lake and in two or three places in the county of Kent. The seams are thin but close to the surface and easily reached. Albertite, which appears to be a form of petroleum, is found in the county of Albert and with it other substances termed bituminous, shale, and also petroleum. Wells of the latter are being operated in Westmorland. Iron is found in many portions of the Province and has been worked extensively in the county of Carleton. Copper ore exists in large quantities and has been worked in Westmorland county. Deposits of nickel, antimony, galena, manganese, and graphite also exist.

New Brunswick is abundantly supplied with limestone, the most valuable deposit being in the county of Saint John. Gypsum is found in large quantities and is extensively quarried in the county of Albert. There are large quarries of granite in various parts of New Brunswick, at Hamstead, in the Nerepis valley, and near Saint George in the county of Charlotte. Marble is also found in some localities. Freestone suitable for building purposes and for the manufacture of grindstones and millstones is also found in many parts of the Province. Slate is abundant and there is clay for the manufacture of bricks in most of the counties. Mineral springs are numerous, the principal ones being in the county of Kings. Salt springs are also found in the same county, and are now being operated with profit. The value of the mineral products of the Province, in 1900, is put down in the least census return at \$650,679.

**Climate.**—The climate, except on the coast of the Bay of Fundy, is similar to that of Quebec and Maine. The winters are severe and in summer a high temperature prevails, but the climate is healthy and there are no diseases peculiar to the soil. Winter begins early in December and lasts until the end of March. The most charming season is the autumn which lingers long. The cold weather does not become established until well on in November. The average rainfall is 30 inches and the average snowfall 88 inches. The total precipitation, rain and melted snow, averages 44 inches.

**Animal Life.**—There is no country in eastern America in which game is more abundant than it is in New Brunswick. There was a time in the history of the Province when, owing to unlawful methods of catching moose, they became scarce, but in recent years, under the protection afforded by the laws enacted by the Provincial government, moose are now abundant. The area of land, which is seldom trodden by human feet in the interior of the Province, is so large that moose find there a splendid haunt, and the same is true with respect to other wild animals.

The caribou, which is a smaller animal than the moose and is allied to the reindeer of northern Europe, is also abundant in New Brunswick. Deer are so plentiful as to have become almost a nuisance and their numbers continue to increase.

New Brunswick has a large number of fur

bearing animals, among which are the bear, the raccoon, the wolverine, the marten, the mink, the otter, the lynx, the muskrat, the woodchuck, the fisher, and the squirrel. The hare is also found in great numbers all over the Province. This animal turns white in winter.

Wild geese are abundant and there are no less than six species of wild ducks besides brant. The great haunts of wild geese and of brant are on the north shore, but wild ducks are to be found on the rivers all over the Province. There are two species of partridge, although the proper designation of this bird is grouse. Curlew, plover, snipe, and woodchuck are also abundant and afford admirable sport. The great northern diver or loon is to be found in all the great rivers. In addition to these, there are two species of eagle, five species of hawks, and four or five varieties of owls. These are but a few of the birds of New Brunswick of which there are about 200 species in all. The Government possesses a splendid collection of them, which can be seen at Fredericton.

New Brunswick is pre-eminently the land of the angler, for nearly all its great rivers abound in game fish. The salmon, the king of sporting fish, frequents all the tributaries of the Saint John below Grand Falls, such rivers as the Tobique being famed for that fish. Salmon also are found in all the rivers of the North Shore. The Nepisiguit, the Restigouche, and the Miramichi have a world-wide reputation as angling rivers. All the lakes of the Province swarm with trout and furnish admirable fishing in their season. There is hardly a stream in the Province in which trout are not to be found, and some of the rivers, such as the Tabusintac, are widely famed for the enormous numbers of fish which have been taken in them by sportsmen. Sea trout of large size swarm in all the rivers which flow into the Gulf of Saint Lawrence in the early summer. In addition to these game fish, other species, which are esteemed in Europe but attract little attention on this side of the Atlantic, such as chub and perch, are very abundant. Pickerel are also to be found in many rivers as well as eels, which frequently attain a large size.

**Agriculture.**—The leading industry of New Brunswick is agriculture, as the greater portion of its people are farmers. The Province contains much excellent land, the marshes at the head of the Bay of Fundy, the intervalles of the Saint John and other large rivers, and the uplands of the northern portion of the Province being very fertile. Wheat is grown successfully in many districts but not in sufficient quantities to supply the needs of the Province. The largest crops are oats, potatoes, turnips, and buckwheat, all of which yield well. A great deal of attention is now being given to dairying. There are numerous cheese factories and creameries in the Province which export their products to England and other countries. The government has a department of agriculture which attends to the needs of that important industry.

According to the census of 1901, the Province had in 1900 897,417 acres under crop, the product being 381,699 bushels of wheat, 99,050 of barley, 4,816,173 of oats, 1,300,855 of buckwheat, 4,649,059 of potatoes, 2,070,486 of field roots, and 512,548 tons of hay. The live stock consisted

## NEW BRUNSWICK

of 61,789 horses, 111,084 milch cows, 116,112 other horned cattle 182,524 sheep, and 51,763 swine. The value of the agricultural property was \$51,338,311, of which \$22,329,482 was in land, \$16,379,456 in buildings, and \$12,629,373 in live stock. The value of the agricultural products for that year was \$12,873,480. The principal crops for 1905 were 404,897 bushels of wheat, 5,486,528 bushels of oats, 1,157,237 bushels of buckwheat, 5,518,732 bushels of potatoes and 2,645,401 bushels of turnips.

**Lumbering.**—The larger portion of the Province is still covered by forests and lumbering is, after agriculture, the principal industry. This business is carried on on a large scale by operators, some of whom own the land upon which they cut their lumber, while others lumber on lands which they lease from the Provincial government which still owns upwards of 10,000 square miles of forest. The principal commercial wood is the spruce, which is sawn into deals and sent to England and the United States. Pine, which formerly abounded, is now scarce. The other forest trees of commercial value are fir, hachmatac, maple, oak, elm, birch, beech, ash, butternut, poplar, and hemlock. The forests exports of New Brunswick amount to about \$5,000,000 a year of which three-fourths goes to Great Britain. The abundance of wood of all kinds in New Brunswick at one time made it a great shipbuilding country and the ships of the Province were known all over the world. This business has been destroyed by the introduction of steel ships and steamships and the only shipbuilding now done in the Province is the construction of small vessels for the coasting trade. The forests of New Brunswick are a large source of revenue to the Government, the amount received for timber licenses and stumpage being in the vicinity of \$300,000 a year.

The principal lumbering rivers of the Province are the Saint John, Saint Croix, Restigouche, and Miramichi and their tributaries. All the rivers of New Brunswick, of any size, contribute something to the lumbering industry.

**Sea Fisheries.**—New Brunswick possesses a coast line on the Bay of Fundy, Gulf of Saint Lawrence, and Bay of Chaleur of upwards of 600 miles and these waters abound in fish. Although less extensive than the fisheries of Nova Scotia, those of New Brunswick are very valuable, the average product being about four and a half million dollars a year. The two greatest fishing countries are Charlotte and Gloucester, but Westmorland, Northumberland, Kent, and Saint John are also well to the front. The value of the fish caught in the Province in 1905 was \$4,671,084. The values of the chief kinds of fish caught were as follows:—Herring, \$1,033,539; sardines, \$788,830; lobsters, \$651,755; cod, \$430,830; smelts, \$346,970; salmon, \$256,145; shellfish, \$164,357; bait, \$181,275; alewives, \$99,632; hake, \$88,571; haddock, \$83,694; rock cod, \$82,950.

**Manufacturers.**—The great manufacturing industry of New Brunswick is the conversion of the lumber of the Province into deals, boards, clapboards, shingles, and similar articles. This industry employs hundreds of saw mills and gives employment to many thousands of men. The Province contains four pulp mills, for the

making of chemical pulp. There are five cotton factories in New Brunswick and several iron foundries. The manufacture of nails is carried on extensively. Boots and shoes are made in a number of places, as are wrappers, paper boxes, woollen cloths, candy, and soap. There are also several furniture factories and carriage factories.

**Revenue.**—The revenue of the Province is mainly derived from subsidies received from the Dominion Government and also from the receipts of the Crown Land Office. There is also a revenue from liquor licenses, succession duties, taxes on incorporated companies, fees of office, and other sources, the whole amounting to about \$900,000 a year. The Province expends yearly about \$215,000 on education, \$225,000 on public works, \$30,000 on agriculture, \$15,000 on game protection, \$60,000 on the Provincial Hospital for Nervous Diseases, and \$60,000 on the Legislature and Executive Government. The debt of the Province, amounting to \$3,500,000, has been largely expended on subsidies to lines of railway, the construction of permanent steel bridges for the highways, and similar services. No direct taxes are levied on the individual by the Provincial government.

**Education.**—The educational system of the Province is based on the theory that the property of the community should support the schools which are free and undenominational. The number of pupils attending the schools is upwards of 60,000. There is a normal school at Fredericton for the education of teachers. Besides the common schools there are superior schools and grammar schools in each county and the cities have high schools which take the pupils to the threshold of the University. The University of New Brunswick, located at Fredericton, is maintained by an endowment granted by the Province and is an efficient institution. There are also two denominational Universities, Mount Allison at Sackville, maintained by the Methodists, and Saint Joseph at Memramcook, maintained by the Roman Catholics. Consolidated schools which are formed by the conjunction of three or more school districts are also being established in several counties.

**Religion.**—There is no State church in New Brunswick, all denominations being on an equal footing. The largest religious body is the Roman Catholic which, at the census of 1901, numbered 125,698. The Baptists come next, numbering 80,874. The adherents of the Church of England number 41,767, Presbyterians 39,496, Methodists 35,504.

**Government.**—The system of government in New Brunswick is based on that of Great Britain, except that there is but one legislative body of 46 members, the Upper House having been abolished in 1892. Every male resident is a voter and responsible government prevails to the fullest extent. The Lieutenant-Governor is appointed by the Government of Canada, but all power rests in the Executive Council which depends for its existence on having a majority in the Legislature. Of the seven members of the Executive Council six are heads of Departments. The term of the Legislature is five years but it may be dissolved at any time by the Lieutenant-Governor.

New Brunswick is divided into 15 coun-

## NEW BRUNSWICK—NEW CAANAN

ties each of which is a municipality and is governed by a body elected by the taxpayers which is known as the Municipal Council and which contains representatives from each parish. Each county is divided into parishes and the Parish Officers are appointed by the Municipal Council. There are also three incorporated cities in the Province and a large number of incorporated towns, almost every small town having now a municipal government of its own.

*Means of Communication.*—New Brunswick contains about 1,500 miles of railway, the principal lines being the Intercolonial, which is owned by the Government of Canada, and the Canadian Pacific. Moncton is the centre of the Intercolonial Railway system, and that line connects Saint John, Fredericton, Chatham, and other important New Brunswick towns with Quebec and Montreal. The construction of the Intercolonial Railway was one of the terms upon which the Maritime Provinces agreed to enter confederation in 1867. The Canadian Pacific Railway has its Atlantic terminus at Saint John and it connects that city as well as Fredericton, Woodstock, Saint Andrews, and Saint Stephen with Moncton and the west. A large portion of the winter traffic of Canada and of the State of Minnesota passes over its road, through New Brunswick to the port of Saint John where there are deep water wharves and elevators. Seven or eight lines of steamships run between Saint John and Great Britain during the winter. The highway roads of the Province have a total length of upwards of 12,000 miles and are well kept up by the Department of Public Works. The bridges number upwards of 4,000.

*Cities and Towns.*—New Brunswick contains three cities and a number of towns which are rising into importance. The largest of these is Saint John (q.v.), situated at the mouth of the river of that name. It is a large shipping port and lines of steamships run from it in winter to Great Britain, carrying the produce of western Canada to European markets. It has railway connection with the west by means of the Canadian Pacific and Intercolonial Railways. Saint John is also a considerable manufacturing centre. Its population is about 50,000.

Fredericton, with a population of 8,000, situated 84 miles up the Saint John river, is the capital of the Province. It is the centre of an important agricultural district and the seat of some manufacturing industries. Moncton, which has upwards of 10,000 inhabitants, is the headquarters of the Intercolonial Railway System and also manufactures to a considerable extent.

Chatham, at the mouth of the Miramichi river, is an important port for the shipment of lumber to Europe. Among the other towns of the Province that are worthy of mention are Saint Stephen, Saint Andrews, Woodstock, Edmundston, Sussex, Dorchester, Sackville, Richibucto, Shediac, Newcastle, Dalhousie, Hillsborough, and Campbellton.

*History.*—New Brunswick was a part of the French Province of Acadia and after the downfall of French power it was a part of Nova Scotia until the year 1784. Fort LaTour, at the entrance of the Saint John river, was the scene of the contests between LaTour and Charnisay

for the mastery of Acadia and of the heroic deeds of Lady LaTour. It was captured and destroyed in 1645. Fort Beausejour, at the head of Chignecto Bay, a stronghold of the French, was taken by the English in 1755. At the close of the War of the Revolution many loyalists who had taken the side of the King in the contest came to New Brunswick and a number of the Loyalist regiments were disbanded in the Province where their descendants still live. After the close of the Napoleonic wars and again after the Irish famine of 1847 large numbers of immigrants came to the Province. About 80,000 of the inhabitants are of French origin, descendants of the Acadians who settled in the country in 1634. The others are of the British races, the English predominating. The population of the Province in 1901 was 331,120.

JAMES HANNAY,

*Author of 'New Brunswick: Its Resources and Advantages.'*

**New Brunswick**, brünz'wîk, N. J., city, county-seat of Middlesex County; on the Raritan River, the Delaware and Raritan Canal; and on the Raritan R., and the Pennsylvania R.R.'s; about 25 miles north by east of Trenton, 30 miles west by south of New York, and 15 miles from the mouth of the river. It was settled in 1681, and until 1697 it was called "Prigmore's Swamp." The name was changed to "Inion's Ferry," and in 1714 it was again changed and called New Brunswick after the House of Brunswick. In 1730 it was granted a royal charter; in 1736 it was incorporated as a town, and in 1784 was chartered as a city. It was the scene of much of the trouble during the Revolutionary War; it was occupied by the British the winter of 1776-7.

It is a manufacturing city, and has considerable trade, as it has good shipping facilities by land and water. The chief manufacturing establishments are cigar factories which have about 1,400 employees; rubber works, 1,000 employees; wall-paper factory, 500 employees; and a large number of smaller works, all of which are prospering. It is the seat of Rutgers College (q.v.), the State Agricultural and Mechanical College (q.v.), and Saint Agnes' Academy. The Theological Seminary of the Dutch Reformed Church is connected with Rutgers. It has seven public schools, three parish schools, the Gardner A. Sage library which contains about 45,000 volumes, and the public library with about 18,000 volumes. The Saint Mary's Orphan Asylum and Home for the Aged is in charge of Sisters of Saint Francis.

The government is administered under the charter of 1863 and is vested in a mayor, who holds office two years, and a council of 13 members. The mayor appoints the board of health and the library trustees; the council elects the water commissioners; the board of education is elected by the people. The city owns and operates the waterworks. Pop. (1890) 18,603; (1900) 20,006; (1910) 23,388.

**New Caanan**, kâ'nân, Conn., town in Fairfield County; on the New York, New Haven & Hartford railroad; eight miles northeast of Stamford and six miles northwest of Norwalk. It is a beautiful residential town and a favorite summer resort for New York business men.

## NEW CALEDONIA — NEW CONNECTION METHODISTS

The surface is hilly, the altitude about 400 feet, and the climate cool in summer and temperate in winter. The hard well-kept roads extend into the country and to the beaches on the Sound. It has some manufacturing establishments, chief of which are clothing, boot and shoe factories, and cigar factories. It has a public library and reading room. Pop. (1890) 2,701; (1900) 2,968; (1910) 3,667.

**New Caledonia**, or *Nouvelle Calédonie*, *noo-vél kā-lā-dō-nē*, an island and penal colony belonging to France, in the Pacific Ocean, lying between the parallel of 20° S. and the Tropic of Capricorn, about 700 miles east of Australia. Its length northwest to southeast is 250 miles, the breadth being about 35 miles. The area is 8,100 square miles. It is surrounded by coral reefs, at a distance of from five to 18 miles. It was discovered by Cook in his second voyage (1774). Two parallel ranges of mountains extend through the island, attaining in the north a height of 5,570 feet. The soil is fertile, and the island produces the bread-fruit tree, banana, sugarcane, arum, cocoa, and excellent timber. The climate is healthful. Iron, copper, cobalt, nickel, silver, mercury, antimony, and gold have been discovered in recent years, and the nickel mines are now an important source of this metal. Coal is also found in abundance. The animals are very few, mammals and reptiles being specially deficient. The Melanesian natives, known as Kanakas, were formerly given to cannibalism. They are mainly Papuan in character, and are grouped in tribes, each with its own chief. In the irrigation and tillage of the soil they show no small skill. The Catholic mission, which has numerous stations, has made many converts. The aborigines sometimes engage as laborers under the Europeans, and natives of the neighboring islands are also introduced for the sake of their labor. The chief crops of the island are maize and taro; and among the other objects of cultivation are rice, wheat, sugarcane, coffee, cotton, coconuts, etc. The imports, largely for the convict stations, are wines and spirits, flour, vegetables, etc.; and the exports include nickel, preserved meat, chrome and other ores, etc. New Caledonia was taken possession of by the French on 24 Sept. 1853, and a small colony was formed there. During the time of the Second Empire it was employed as a place of banishment for criminals, a purpose which it still serves. The dependencies of the island are the Isle of Pines, the Loyalty Islands, the Huon Islands, the Chesterfield Islands, and the Wallis Archipelago. The whole of this territory is under a governor, advised by a council-general, and is divided into five arrondissements, of which four are ruled by administrators, whilst the fifth, *Nouméa*, is directly under the governor. The government of the island is essentially military, and the frequent escape of convicts (sometimes unwelcome visitors to Australia) has rendered the authorities very strict. The convicts are grouped in five classes, of which two have contributed much to the improvement of the colony by the construction of roads, etc., whilst a third is virtually free. A railway now connects *Nouméa* with *Kanala*. The capital, and only important town, is *Nouméa*, formerly called *Port-de-France*, with a pop. (1901) 6,968. It lies in a small mountainous peninsula on an excellent bay of the same name. The last census

population was 51,415, of whom 12,253 were European civilians, 10,056 undergoing punishment, and 29,106 natives. Consult Griffith, 'In an Unknown Prison Land' (1901).

**New Caledonia**, North America, a former name for a region west of the Rocky Mountains, 500 miles long from north to south, and 400 from east to west, now included in British Columbia.

**New Castile**, *kās-tél'*, Spain, an ancient province, corresponding to the old kingdom of Toledo, and now forming the provinces of Madrid, Ciudad-Real, Cuenca, Guadalajara, and Toledo, occupying nearly the centre of the peninsula; it had an area of 28,010 square miles, and the population of the region in 1910 was 2,000,000. With the province of Old Castile which bounded it on the north, and is now divided into the provinces Avila, Burgos, Logrono, Palencia, Santander, Segovia, Soria, and Valladolid, area, 25,490 square miles, pop. about 1,900,000. New Castile formed the kingdom of Castile which was instrumental in expelling the Moors from Spain (q.v.).

**New Church**. See SWEDENBORGIANS.

**New-chwang**, *nū-chwāng'*. See NIU-CHUANG.

**New College**, Oxford, England, was founded in 1379 by William of Wykeham, bishop of Winchester and lord-chancellor of England, as the College of Saint Mary of Winchester, the scholars to be recruited from the most promising pupils of the great public school of Winchester (q.v.). Its original establishment comprised a warden, 70 fellows and scholars, 10 chaplains, three clerks, and 16 choristers; its modern establishment comprises a warden, 22 fellows, three chaplains, 40 scholars, a choir, and an average of nearly 300 graduates. Forty church presentations are within its gifts. The college buildings are among the finest in Oxford, and originated the style of English college architecture; the chief features are the hall, the chapel, and the gardens. Among celebrities associated with the college are Vitelli, Grocyn, Archbishop Chichele, Bishops Waynflete, Lowth, Ken, and Sydney Smith.

**New Comerstown**, *kūm'érz-town*, Ohio, city, in Tuscarawas County; on the Tuscarawas River, and on the Pennsylvania and the Pittsburg, C., C. & St. L. R.R.'s; about 80 miles east by north of Columbus. It is in a fertile agricultural region, near bituminous and clay deposits. The chief manufactures are lumber and planing mill products, cigars, brick, and dairy products. Pop. (1890) 1,251; (1900) 2,659; (1910) 2,943.

**New Connection of General Baptists**, an orthodox body protesting against the growing Arianism and Socinianism of the English Baptist Church dating from 1770 and led by Dan Taylor (1738-1816), a Cornish miner.

**New Connection Methodists**, the first secession from the English Wesleyans, dating from 1797. The New Connection comprised the followers of Alexander Kilham (hence sometimes called *KILHAMITES*), who in 1795 published 'The Progress of Liberty,' a criticism of the lax church discipline of the day, for which he was expelled from the Conference a year later. In 1797 three other ministers joined him.

## NEW CREEK—NEW ENGLAND ORDER OF PROTECTION

The church government of the New Connection gives laymen equal authority with the clergy in Conference. With but a few congregations in Ireland and in Canada the body is not growing and in 1890 numbered about 35,000 members.

**New Creek (Keyser), Engagements at.** While Gen. J. E. Johnston was at Winchester, Va., 14 June 1861, he heard that Col. Lew Wallace, with the 11th Indiana regiment, had marched from Cumberland, Md., and driven a Confederate force from Romney. Believing it to be the advance of McClellan's column from West Virginia, Johnston ordered Col. A. P. Hill, with three regiments, to march on Romney, 45 miles west, drive out Wallace, and destroy the bridges on the Baltimore & Ohio Railroad west of Cumberland. Hill reached Romney, but Wallace had fallen back to Cumberland. At night of the 18th Hill sent Col. Vaughn, with four companies of infantry, to destroy the bridge of the Baltimore & Ohio Railroad over New Creek, guarded by about 200 local militia and two guns. Vaughn crossed the north branch of the Potomac, beyond which the Union troops had taken position, and put them to flight, captured the two guns and a set of colors, burned the bridge over the mouth of New Creek, and then pushed on to Piedmont, five miles westward, destroyed parts of the railroad and cut the telegraph wires, and then returned to Winchester. Later the position at New Creek was fortified and garrisoned to protect the railroad bridge. On 4 Aug. 1864 it was held by Col. Robert Stevenson of the 154th regiment Ohio National Guard with his regiment, small detachments of three other regiments, and eight guns, in all about 1,500 men. During the day Stevenson was attacked by Gen. John McCausland, who, returning from his raid on Chambersburg, had approached by way of Romney. After a severe fight of several hours McCausland withdrew toward Moorefield, leaving several dead and severely wounded on the field. The Union loss was 8 killed, 29 wounded and missing. On 27 Nov. 1864 New Creek was held by Col. Latham, 5th West Virginia cavalry, with about 700 dismounted cavalry, four heavy guns, and three field pieces. On the morning of the 27th Gen. Rosser with two brigades of cavalry, his own and Payne's, crossed Great North Mountain into Hardy County, surprised and captured Latham's pickets, charged over his works, and captured his artillery and most of his command with but slight resistance. The prisoners taken numbered about 500, and with them their arms and some colors. Four of the seven guns, being heavy pieces, were spiked and left, the carriages being burned. All the government buildings, containing a large amount of ordnance, quartermaster and commissary stores, and 200 wagons, were burned, and Rosser marched away with his prisoners, three guns, about 250 horses, also several hundred head of cattle and a large number of sheep collected from the farms of Hardy and Hampshire Counties. E. A. CARMAN.

**New Cumberland, W. Va.,** town, county-seat of Hancock County; on the Ohio River, and the Pittsburgh, C. C. & St. L. railroad; about 35 miles north of Wheeling. In the vicinity are coal mines and valuable clay beds.

The chief manufactures are sewer pipe, tile, a semi-porcelain pottery, fire and paving brick, foundry products, and machinery. It has large mills where the fire clay, for use in the iron works, is pulverized. It has an extensive trade in coal and clay products. Pop. (1910) 1,807.

**New Decatur, de-kā'tér, Ala.,** city, in Morgan County; near the Tennessee River, and on the Memphis & C., and the Louisville & N. R.R.'s; about two miles south of Decatur and 85 miles north by west of Birmingham. The first settlement was made in 1887, and in 1889 it was incorporated. It is an agricultural, lumbering, and manufacturing section of the State. Its industrial interests are connected with the manufacturing and shipping of iron products, lumbering and farm products. It has a good trade in wool. Pop. (1910) 6,118.

**New Eng'land,** a collective term applied to the northeastern portion of the United States, comprising the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. It extends from lat. 41° to 48° N., and from lon. 67° to 74° W., with an aggregate area of 65,000 square miles. It has a coast line of about 700 miles, without allowing for the smaller inlets, and constitutes a large part of the great peninsula which, including Nova Scotia, New Brunswick, and parts of Lower Canada, is formed by the Atlantic Ocean, the St. Lawrence, and the connected waters of Lakes Champlain and George and the river Hudson. It was originally granted for colonization by James I. in 1606 to the Plymouth company under the name of North Virginia, and received its present name from Capt. John Smith, who in 1614 explored and made a map of the coast. For the details of the geography and history of New England, see the States respectively of which it is composed. Consult Palfrey, 'History of New England.'

**New Eng'land, A Compendious History of,** by John Gorham Palfrey (q.v.). It covers the time from the first discovery of New England by Europeans down to the first general Congress of the Anglo-American colonies in 1765, with a supplementary chapter giving a summary of the events of the last ten years of colonial dependence, and was published 1865-73.

**New England Emigrant Company, The,** in American history, a corporation organized at Boston in 1855 to control emigration to the Territory of Kansas in the interest of the anti-slavery party. The Emigrant Company aided largely in making Kansas a free State.

**New England Historic and Genealogical Society, The,** an association organized in Boston, Mass., in 1845 for historical research and the preserving of early New England records. A quarterly magazine, 'The New England Historical and Genealogical Register,' was begun in 1847 and the society also publishes the 'Bibliopolist' for circulation among its members. The library of the society contained in 1903 over 32,000 volumes.

**New England Order of Protection,** an American fraternal and beneficial Society organized in 1887. In 1903 it had 6 grand lodges, 335 sub lodges and 31,584 members. In 1902 it disbursed \$485,000 in benefits, and over \$3,000,000 since its organization.



## NEW ENGLAND PRIMER — NEW GUINEA

**New England Primer**, a famous educational work, compiled by one Benjamin Harris, an English versifier and printer, who established a nondescript shop in Boston during the reign of James II. He first published 'The Protestant Tutor,' and before 1690 the 'New England Primer' as an abridgment of the earlier work. It is thought that in the 18th century about 2,000,000 copies were sold, yet of these less than 50 are known to be extant. These surviving copies represent about 40 editions. Only a small portion of the supposed 1st edition is in existence, this so-called 'Bradford Fragment' having been discovered as waste in the binding of a later work. The contents of the 'Primer' was variously altered in accommodation to religious and political changes. The alphabet rimes, with wood-cuts crude as themselves, are probably the best-known feature. One of the most curious of these illustrations shows Job liberally covered with spots. The shorter Westminster catechism is also included. P. L. Ford (q.v.) did much to clear up the subject of the 'Primer' by his historical and bibliographical study, 'The New England Primer: A History of its Origin and Development, with a Reprint of the Unique Copy of the Earliest Known Edition' (1897).

**New England Shilling**, the name given to the first American colonial coins issued in 1652. They were of the value of "12d, 6d and 3d peeces," stamped N E on the face and XII, VI or III on the reverse to denote the value. See NUMISMATICS.

**New England Theology**, a Calvinistic school of theology, originated in New England by Jonathan Edwards (see EDWARDS, JONATHAN). This school was controversially opposed to Arminianism (q.v.). A new element was introduced into the theological atmosphere of New England by the preaching of Universalism (q.v.) by John Murray 1770. The controversies of the early 19th century resulted in the crystallization of New England Theology into a complete system, comprising the tenets, that sin is voluntary; that depravity is inherited from Adam; that repentance or turning to God can only result from preventing grace; that man has complete freedom of will; that holiness consists in unselfish love; that certain persons are predestined to receive the grace of God which leads to repentance. Modern philosophy and criticism have dissolved the dogmatism of this theology which is no longer taught in an unmodified form in Congregational seminaries. Consult: Walker, 'History of the Congregational Churches in the United States' (1894); Boardman, 'New England Theology' (1899).

**New Essays: Observations, Divine and Moral**, collected out of the Holy Scriptures, Ancient and Modern Writers, both Divine and Human; as also out of the Great Volume of Men's Manners: tending to the furtherance of Knowledge and Virtue. By John Robinson (q.v.) (1624). A volume of 62 essays, on the plan of Bacon's, but at greater length, and in ethical, religious, and human interest more like Emerson's 'Essays' in our own time: the work of an English clergyman and scholar, in exile at Leyden in Holland, under whose ministry and through whose counsel the Pilgrim Fathers de-

veloped religious liberalism and executed the earliest planting of New England.

**New Forest**, England, a public pleasure ground in the southwest of Hampshire, bordering on the Solent and English Channel, and bounded northeast by Southampton Water, and west by the river Avon. It measures 14 by 16 miles, is about 60 miles in circuit, and has an extreme area of 144 square miles. Its name dates from 1079 when William the Conqueror made a "mickle deer-frith," in so doing destroying several hamlets. This afforestation, enforced by the savage "Forest Laws" was regarded as an act of the greatest cruelty, and the violent deaths in the forest of his sons Richard and William Rufus, were looked upon as special judgments. Oak and beech are the principal trees; the deer were removed in 1851. The forest is under the supervision of the Court of Verderers since 1877; it gives its name to a county parliamentary division. There are several villages within its limits, Lyndhurst being the forest capital.

**New France**, or **La Nouvelle France**, là noo-vêl frânç, the original name given to Canada (q.v.) by the earliest settlers, who were Frenchmen.

**New Glasgow**, gläs'gò or -kò, Canada, town of Pictou County, Nova Scotia; on the East River near its entrance into Pictou Harbor, and on the Intercolonial Railway, 104 miles northeast of Halifax, 8 miles south of Pictou, on the Northumberland Strait. In the vicinity are rich deposits of coal and iron, which contribute to make it an important centre for the manufacture of iron and steel. It also has large ship-building yards, foundries, machine shops, tanneries, glass and pottery works, and a considerable trade in coal, iron ore, and manufactured articles; good schools, churches, etc. Pop. about 5,000.

**New Granada**, grā-nā'da, the name by which the republic now called Colombia (q.v.), was known for many years after its settlement by people from Granada, Spain.

**New Guinea**, gīn'ī, or **Papua**, pāp'oo-ā or pā'poo-ā, Australasia, a large island of the Melanesian region, the western and larger portion of which belongs to the Netherlands, while the eastern portion is divided into northern and southern sections, belonging respectively to Germany and Great Britain. The island, which after Australia and Greenland ranks third among the largest islands of the world, lies on the southwestern side of the Pacific Ocean, between lat. 0° 10' and 10° 42' S., and lon. 130° 57' and 150° 52' E. Its length is about 1,490 miles; maximum breadth, 410 miles; estimated area, over 312,000 square miles. It is separated from Australia (Queensland) on the south by Torres Strait, from the northern territory of South Australia by the Arafura Sea, and from the Moluccas on the west by Gilolo Passage. The island has a somewhat irregular form, but it may be described as consisting of a broad central portion from which proceed two narrower peninsulas, one in the northwest and the other in the southeast. The coasts are mostly lofty, but in the neighborhood of Torres Strait and to the west the shore presents the appearance of a marshy flat, covered with dense forests. The outline is broken by many indentations,



## NEW CREEK—NEW ENGLAND ORDER OF PROTECTION

The church government of the New Connection gives laymen equal authority with the clergy in Conference. With but a few congregations in Ireland and in Canada the body is not growing and in 1890 numbered about 35,000 members.

**New Creek (Keyser), Engagements at.** While Gen. J. E. Johnston was at Winchester, Va., 14 June 1861, he heard that Col. I. Wallace, with the 11th Indiana regiment, had marched from Cumberland, Md., and driven a Confederate force from Romney. Believing to be the advance of McClellan's column into West Virginia, Johnston ordered Col. William H. Hill, with three regiments, to march to Romney, 45 miles west, drive out Wallace, destroy the bridges on the Baltimore and Ohio Railroad west of Cumberland. Hill did not reach Romney, but Wallace had fallen back to Cumberland. At night of the 18th Hill sent Col. Vaughn, with four companies of the 11th Indiana, to destroy the bridge of the Baltimore and Ohio Railroad over New Creek, guarding the north branch of the Potomac River, which the Union troops had crossed and put them to flight, capturing a set of colors, burned the mouth of New Creek, and moved to Piedmont, five miles west of the railroad and cut it, and then returned to Washington. The position at New Creek was held until Aug. 1864 it was held by the 154th regiment of the 154th regiment, with his regiment, and other regiments, about 1,500 men. During the attack by Gen. Lee, turning from his position, approached by a fight of several days toward Moorhead, severely wounded, loss was 800. On 27 Nov. 1864, Latham, a 700 dismounted, three for Gen. Lee, own a town, ture wor his pri th, sev

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The most northerly of  
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40° 40' and 45° 18' 23" north  
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is bounded on the north by the  
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southeast by the Atlantic Ocean  
Mass., on the south by the  
achusetts, on the west and north-  
the State of Vermont and partly  
of Quebec. Within these  
an area of 9,336 square miles  
diversified country, comprising sea  
rivers, mountain ranges, forests  
land. The surface contour is in gen-  
and picturesque. By reason of lati-  
proximity, high mountains and nar-  
the climate conditions present great  
the mean average temperature of the  
portion for the year is 41; for the win-  
the summer 65; of the southern part  
average for the year is 45; for the  
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on is nearly 40 inches per year, quite  
distributed both as to area and period.  
are five distinct water-shed areas, drained  
the Connecticut, Merrimac, Androscoggin,



## NEW HAMPSHIRE

among the chief being the Gulf of Papua and M'Cluer Inlet on the southern side, and Great Geelvink Bay, Astrolabe Bay, and Huon Gulf on the northern side. Many islands, large and small, lie off the coast, chief of which are those of the Bismarck Archipelago (q.v.) belonging to Germany off Kaiser Wilhelm Land, the north-eastern section of New Guinea.

In the southeast of the island the mountain ranges rise in Owen Stanley to a height of 13,205 feet; farther west and near the north coast Mount Schopenhauer reaches 20,000 feet; in the eastern continuation of the Charles Louis Range in Dutch New Guinea, as yet unexplored, there are still loftier mountains, covered with perpetual snow, and volcanoes. The chief rivers are the Fly, in British territory, with its tributary the Strickland; the Kaiserin Augusta, in German territory; and the Amberno, in Dutch territory, with a large delta. New Guinea has few indigenous mammals, and all these, with the exception of a species of pig and some mice, are marsupials and monotremes. It abounds in birds, among which are immense flocks of parrots, pigeons, and kingfishers, and the celebrated birds of paradise. There are also several remarkable species of bower-birds, belonging to the genus *Amblyornis*. The forests abound in enormous trees, including the camphor-tree; and bananas, coconuts, sago, sugarcanes, rice, maize, and yams, are cultivated by the natives. On the west coast there are numerous Malay settlements, but the bulk of the inhabitants is composed of Papuans, a race resembling the negroes of Guinea. They are divided into numerous tribes chiefly in a neolithic stage of civilization, some of whom are of a friendly disposition, while others are fierce and untractable, but gradually improving under Europeanizing and missionary influence.

The discovery of New Guinea is said to have been made by Abreu in 1511, but the first navigator who is known to have visited the island was another Portuguese, Jorge de Meneses, who touched on it in 1526. The present name was given to the island by the Spaniard Ynigo Ortiz de Retes, who sailed along its north coast in 1546. From the beginning of the 17th century much exploring work was done by the Dutch, especially along the west and south coasts of what is now Dutch New Guinea. Dampier in 1700 added to our knowledge of the south coast, and discovered Dampier Strait. In 1827 the Dutch formed a settlement at Triton Bay, but they soon abandoned it. The southeast coast was surveyed between 1845 and 1850 by Captain Owen Stanley, and 1873 Captain Moresby ascertained the exact form of the southeastern extremity. The naturalists were the first to make incursions into its interior, and among these Dr. A. R. Wallace, who visited it in 1858, was the pioneer. The missionaries came next, and mission stations formed by Germans are maintained on the northeast coast, and by the London Missionary Society at various points on the southeast coast. Germany, and the Australian colonies also, began to take an interest in New Guinea, and the latter urged the British Government to annex the east part of the island, the west portion having long been recognized as Dutch. The delimitation and division of the island between Great Britain, Germany and Holland was settled in 1885. That part of the island

lying west of the 141st meridian was assigned to Holland, and comprises 151,789 square miles; the north part of the rest of the island is assigned to Germany, and the south to Great Britain. The Germany territory, called Kaiser Wilhelm's Land, contains about 70,000 square miles; the English territory, 90,540 square miles.

The government of the British portion is in the hands of an administrator appointed by the crown, assisted by an executive and a legislative council. New South Wales, Victoria, and Queensland each contribute to the expense of the government. Land cannot be purchased except from the administrator. The deportation of the natives is forbidden, as is also the sale to them of firearms, intoxicating spirits, or opium. The official centre is Port Moresby. The islands of Torres Strait, which are the seat of a valuable pearl-shell and trepang fishery, and which practically command the strait, have all been annexed to Queensland. A German chartered company whose object is to develop the resources of the country has stations in German New Guinea, where also the sale of firearms, gunpowder, and spirits is forbidden. The Dutch have done little or nothing for their portion of the island. The population of the Dutch portion is estimated at 200,000; of the German, 110,000; of the British, 350,000; total, 560,000. Consult: Chalmers, 'Pioneer Life and Work in New Guinea' (1895); Cooke, 'Australian Defences and New Guinea' (1887); Haddon, 'Decorative Art of British New Guinea' (1894); MacGregor, 'British New Guinea' (1897); Romilly, 'The Western Pacific and New Guinea' (1887); Webster, 'Through New Guinea' (1889).

**New Hampshire**, hămp'shîr, one of the New England States, is named from Hampshire in England, the title being first applied in 1629. It is also locally and popularly known as the "Granite State."

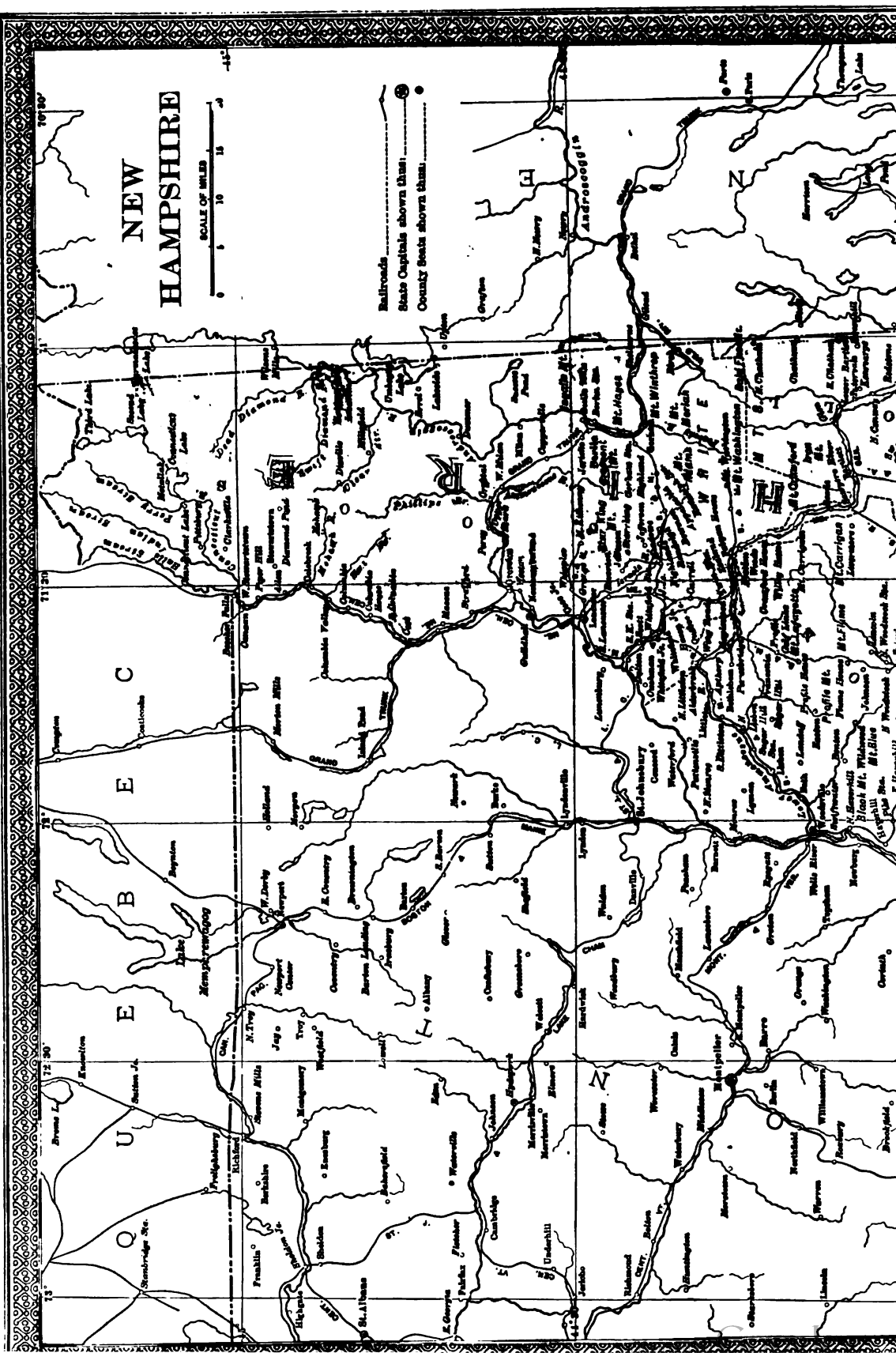
**Physical Conditions.**—The most northerly of the 13 original colonies, New Hampshire lies 70° 37' and 72° 37' longitude west from Greenwich, and between 42° 40' and 45° 18' 23" north latitude. In general outline its outline is that of a scalene, almost a right-angled triangle, with a north and south perpendicular of 180 miles. The extreme width near the southern boundary is 100 miles. The State is bounded on the north by the Province of Quebec, on the east by the State of Maine, on the southeast by the Atlantic Ocean and Essex County, Mass., on the south by the State of Massachusetts, on the west and northwest chiefly by the State of Vermont and partly by the Province of Quebec. Within these bounds is included an area of 9,336 square miles of greatly diversified country, comprising sea coast, lakes, rivers, mountain ranges, forests and tillable land. The surface contour is in general rugged and picturesque. By reason of latitude, ocean proximity, high mountains and narrow valleys the climate conditions present great variety. The mean average temperature of the northern portion for the year is 41; for the winter 17; for the summer 65; of the southern part the mean average for the year is 45; for the winter 23; for the summer 66.5. The average precipitation is nearly 40 inches per year, quite evenly distributed both as to area and period. There are five distinct water-shed areas, drained by the Connecticut, Merrimac, Androscoggin,



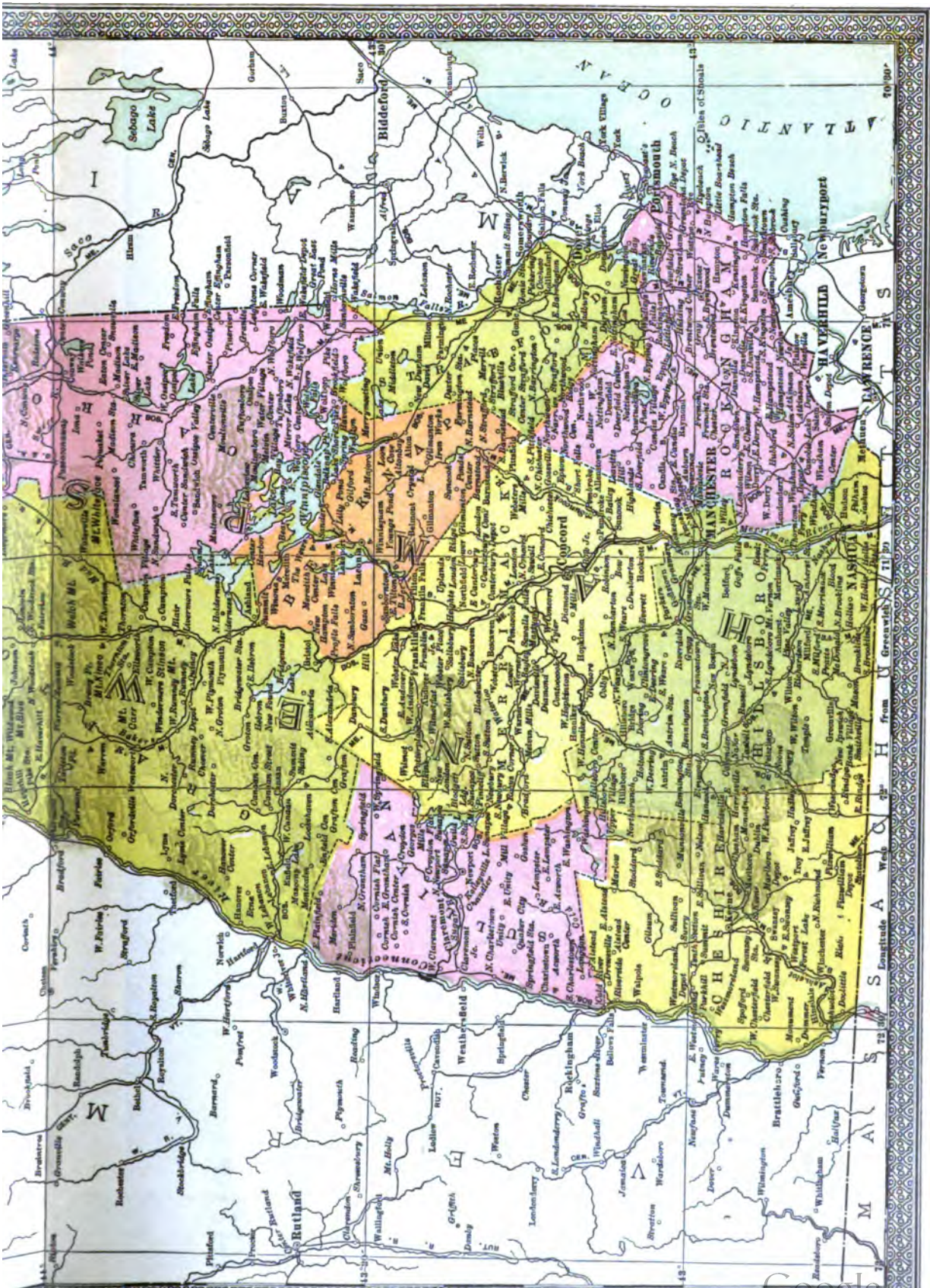
# NEW HAMPSHIRE

SCALE OF MILES  
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Railroads  
State Capitals shown thus: ●  
County Seats shown thus: ○











## NEW HAMPSHIRE

Saco and Piscataqua rivers and their numerous tributaries. These streams contribute materially to the economic resources of the State through their abundant water power, and to the fertility of their valleys. The mountain district comprises 1,270 square miles, the culminating point of which is Mount Washington, 6,270 feet high. This area is divided into two nearly equal divisions by the deep and continuous valleys of the Saco and the Ammonoosuc, and these in turn are subdivided into several smaller groups. Winnepesaukee, situated in Belknap and Carroll counties, is the largest lake, having an area of 70 square miles, exclusive of islands, of which it contains 264. Other important lakes in order of their size are Umbagog, 18 square miles; Squam, 15.6, and Sunapee, 11.2.

**Settlement.**—The first description of any of the region now included within the State of New Hampshire was given by Captain John Smith, who skirted the New England coast in 1614, from Penobscot Bay to Cape Cod, and discovered the Piscataqua River and the adjacent harbor, although the coast is said to have been visited in 1603 by Martin Pring. In 1623 the first settlement on the mainland was effected. That of Thomson at Odiorne's Point and that of the Hiltons at Dover Point have occasioned some controversy among the local historians on questions of priority. Several other settlements followed in the succeeding 20 years. A movement up the Merrimac Valley began and was continued in the later colonial period in accordance with the jurisdictional claims of Massachusetts, which at times were asserted, theoretically, to an east and west boundary three miles north of a point now and since 1652 marked by Endicott Rock in Lake Winnepesaukee at the Weirs. The Connecticut Valley was an attractive region and settlers worked their way northward in the face of the torch and tomahawk, from Fort Dummer to "No. 4," in the intervals between the Indian wars. A much later influx of settlers from southern New Hampshire, Massachusetts, Rhode Island and Connecticut should also be noted. Practically the whole of the northwestern portion of the State had remained ungranted and unsettled until the English conquest of Canada in 1760. But as soon as peace assured tranquillity to settlers, a tide of immigration at once set in along the course of the Connecticut and its tributaries, and in the years from 1749 to 1764 Gov. Wentworth granted no less than 129 townships and six individual grants west of the Connecticut and 50 or more on the east side. About the same time still another, but less important movement, was going on in the valley of the Saco.

**Political Divisions.**—For purposes of administration the State is divided into 10 counties, with county-seats and population as follows:

Counties	Pop. 1910	County- seat	Pop. 1910
Belknap.....	21,309	Laconia.....	10,183
Carroll.....	16,316	Ossipee.....	1,354
Cheshire.....	30,659	Keene.....	10,068
Cooks.....	30,753	Colebrook.....	1,905
		Lancaster.....	3,054
		Haverhill.....	3,498
		Plymouth.....	2,200
Grafton.....	41,652	Lebanon.....	5,718
		Manchester.....	70,063
Hillsborough.....	126,072	Nashua.....	26,005
Merrimack.....	53,335	Concord.....	21,497
Rockingham.....	52,188	Exeter.....	4,897
Strafford.....	38,951	Portsmouth.....	11,269
Sullivan.....	19,337	Dover.....	13,247
		Newport.....	3,765

**The United States Courts.**—The Federal circuit and districts courts are held at Portsmouth, Concord and Littleton (population 4,069). The district judge resides at Littleton and the residence and office of the clerk of these courts is at Concord.

**Population.**—In 1900 New Hampshire stood 37th in respect to population, having a total of 411,588. Of these 323,481 were native born, and 88,107 foreign born. There were 12,924 aliens. In 1910 the State was 39th with 430,572. There are 11 cities with population as follows: Berlin 11,780, Concord 21,497, Dover, 13,247, Franklin 6,132, Keene 10,068, Laconia 10,183, Manchester 70,063, Nashua 26,005, Portsmouth 11,269, Rochester 8,868, Somersworth 6,704.

The suffrage is accorded to males 21 years of age, except paupers, persons voluntarily excused from taxation, and unnaturalized aliens. An educational test was imposed by the last amendment of the constitution. Women may vote in school meetings. The State election is biennial, on the even year, and occurs in November. The governor, council of five members, and the legislature, which consists of 24 senators and (1910) 389 representatives, assume office on the first Wednesday in January of the odd years. The number of senators is fixed at 24, while the membership of the house depends upon population. Concord became the seat of government in 1808, and the state house was erected there in 1819. The ancient New England town system still prevails except in the cities, and is regarded as preferable to the city form of government in municipalities even of very large population.

**The Judiciary.**—The courts of the State are a supreme court, consisting of a chief justice and four associates, having jurisdiction over issues of law; a superior court, consisting of a chief justice and four associates, having jurisdiction for the trial of issues of fact, the judges of this court attending the trial terms in a circuit of the shire towns which includes the entire State; the 10 courts of probate organized with a judge and register for each county; the municipal courts (one in each of the 11 cities and 33 towns), having limited and preliminary criminal jurisdiction and jurisdiction of civil causes in which not more than \$100.00 is claimed and the title of real estate is not in issue; justices of the peace, having preliminary and limited criminal jurisdiction in towns and places where no municipal court is established and jurisdiction in civil causes to the amount of \$13.33, provided the title to real estate is not involved. The board of railroad commissioners, the board of license commissioners and the board of equalization of taxes also have judicial functions. Admission to the bar requires three years of actual and certified study, followed by examination, both oral and written, before a standing board of examiners appointed by the court. Certificates of graduation from law schools are not accepted in lieu of actual qualification, ascertained in the manner above stated.

**County Government.**—A board of three commissioners elected by popular vote are the executive officers of each county. These officials also have certain judicial functions relative to the laying of highways, the settlement of paupers and issues of fact referred to them for trial by the superior court. The members of the legis-



## NEW HAMPSHIRE

lature for each county, assembled in convention, are a legislative body for the county. They vote taxes for county purposes and direct as to their expenditure.

**Agriculture.**—About 62.6 per cent. of the land area of New Hampshire, or 5,640 square miles, is devoted to agriculture. In the early life of the State this industry, as is usual in most new communities, largely predominated over all others, and although it now occupies a second place, it is still of great importance. The soil along the sea-coast and in the river valleys is fertile, while the upland farms require careful treatment to render them fairly productive. The number of farms has fluctuated only slightly from decade to decade since 1860, and in 1910 is 26,913, or 2,411 less than at the last census. These farms contain 3,242,000 acres, of which 927,000 are improved, and 2,315,000 are unimproved. The acreage of improved land has decreased 14 per cent since 1900. This significant fact denotes a readjustment of methods to meet the competition of the West. Cereals and crops requiring large areas have given place to the more intensive forms, such as dairying, fruit growing, market gardening, poultry raising, etc. From 1900 to 1910 the value of farm land has increased \$8,828,000, being estimated (1910) at \$44,327,000. A board of agriculture, established in 1820, a board of cattle commissioners, established in 1891, and an extensive and an influential State section of the Patrons of Husbandry, introduced in 1873, are directing, co-operating and stimulating forces in the field of agriculture. The recently organized Board of Commissioners for the examination of veterinary surgeons, as well as efficient laws governing the inspection of cattle, of milk and other food products, and the prevention of the adulteration and the commercial imposition of fraudulent and deleterious food stuffs, are in the domain of official activity endorsed or sustained by the State in the interest both of improved agriculture and the conservation of the public health. These agencies are partly under the direction of the Board of Agriculture, partly subordinate to the State Board of Health, and partly in the exercise of functions under organizations distinct from either of those boards.

**Manufactures.**—The excellent water-power privileges upon the numerous streams of the State early become a controlling factor in the permanent location and development of manufacturing industries. Since 1850 the progress has been striking, especially compared with the slow growth of population, and during that period manufacturing has supplanted agriculture as the leading industry of the State. While the increase of population since 1850 has been but 29.4 per cent, that of the average number of wage earners has been 159.9 per cent. In 1850 the latter constituted only 8.5 per cent of the population, while in 1900 they had increased to 21.1 per cent. The manufacture of boots and shoes has assumed strikingly large proportions, and now, with a total output of \$23,405,558, occupies the first place, which for a long time was held by the manufacture of cotton goods. Although the latter industry has now taken second place, its growth has been steady. The Amoskeag corporation continues to hold its rank as the largest single establishment for the manufacture of cotton goods in the world. The total production is about \$23,000,000 annually. The

woolen industry ranks third, its history extending over a period from 1801 when James Sander-son built, at Ipswich, the first carding mill in the State. The total output of this industry is valued at about \$10,500,000. Lumber and timber products, the fourth in rank, date their history from the erection by Mason's colonists of the first saw-mill in New England near Portsmouth in 1635. The lumber mills in Berlin and Lincoln have been developed and improved in recent years until they are among the most extensive and best equipped in the United States. The total production is about \$9,225,000. Among other important industries are the manufacture of wood-pulp, hosiery and knit goods, and foundry and machine-shop products. There are (1909) 1,961 manufacturing establishments with a total capital of \$139,873,000, and a production of \$164,461,000. They were paying \$40,-286,000 to 82,041 wage earners. Important brewing and distilling establishments are located at Portsmouth and Manchester.

**Finance.**—The report of the treasurer for the fiscal year ending 1 Sept. 1910 showed a total of receipts and cash on hand (from 1 Sept. 1909) of \$3,046,216.12; disbursements for the same year \$2,666,771.05, leaving cash on hand, \$379,444.87. The net indebtedness of the State at that date was \$1,293,209.33. The assessed valuation of taxable property was \$255,085,571, and the rate \$20.58 per \$1,000.

**Banks.**—In 1792 the first bank was established at Portsmouth on 30 June 1909. There were 56 National banks, having 9,528 depositors and \$1,710,780.41 savings deposits; 9 State banks, having 13,888 depositors and \$4,655,577.86 savings deposits; 51 savings banks with 174,341 depositors and \$77,093,356.95 savings deposits. The loans and discounts of the National banks were \$16,127,647. The average deposits to each depositor in the savings banks was \$446.08. No private banks or loan and trust companies made report. The supervision of State banks is permitted to a board of three commissioners, whose office was established in 1837.

**Insurance.**—A total of 108 fire insurance companies were doing business in the State 1 April 1903. Of these 30 were mutual; 78 were stock companies of which 30 were domestic, and 48 foreign. There were also 26 life insurance companies, 7 fidelity and surety companies, 18 casualty companies, 6 assessment casualty companies and 29 fraternal associations. The total of premiums received by all companies was \$3,065,925.53, and the total of losses paid was \$2,126,498.93. It was in New Hampshire that the valued policy law first became established after a notable contest with the insurance companies in 1885. A single State commissioner supervises all branches of insurance. The office was created in 1851.

**Railroads.**—The first railroad was chartered in 1835, since which time the mileage has increased to 1,189.34. The railroads of the State are now consolidated under the systems of the Boston & Maine, which operates 1,037.15 miles; the Maine Central, 100.13; the Grand Trunk, 52.06. There has been but one accident in New Hampshire since 1883 in which a passenger has been seriously injured, while being transported upon a steam passenger train. In 1900 there were 10 street railways, with a mileage of 138, which had issued stock to the amount of \$1,478,000.00; and bonds to the amount of \$1,486,744.76. A

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CAPITOL BUILDING AT CONCORD.



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railroad commission of three members has been appointive since 1883, but the office as first established in 1844 was elective and continued to be for 40 years. Under later laws the functions of the commission have become greatly extended.

*Accommodation for Tourists.*—The State is becoming the home and a place of sojourn of thousands of those who are seeking recreation and location in a region of the most healthful climate and the most attractive ocean and mountain scenery on the eastern side of the national domain. Recent statistics of this business exhibit an investment of \$10,442,352 in the State. The help employed in 1899 was 12,354, with wages of \$539,901; 204 towns were entertaining summer tourists; more than 20,000 of these people occupied cottages in 1899. They were also patronizing several hundred hotels, and 1,624 farm houses. The volume of this business estimated by its cash receipts in 1899 was nearly \$7,000,000.

*State Institutions.*—The New Hampshire Asylum for the Insane, founded at Concord in 1838, is supported by occasional State aid, the income of invested funds, and sums paid by individuals for care of patients. Each county has also its own insane asylum and almshouse. The State board of health is also a commission of lunacy. The New Hampshire Orphans' Home was established at Franklin in 1871. It is undenominational, and is supported by voluntary contributions. The State prison at Concord was established in 1812. There is also an industrial school at Manchester, and a School for the Feeble Minded at Laconia. The New Hampshire Conference of Charities and Correction is a semi-official organization, wholly educational in its purposes. A considerable number of well ordered and beneficent institutions devoted to hospital purposes, the care and education of orphans and other worthy objects of religious charity have been established at populous points and are maintained by the authorities of the Roman Catholic Church. Many local hospitals are established under secular control, by municipal support or through private benefactions. Eighteen of these institutions are located as follows: Berlin, Claremont, Manchester (3); Plymouth, Exeter, Dover, Nashua (2); Laconia, Hanover, Concord (2), Portsmouth, Woodstock and Whitefield. Homes for orphans and retreats for the aged are established at Manchester and Concord, one by the Masonic fraternity and the other by the order of Odd Fellows.

*Public Health.*—This function of the State government has been developed to a very efficient status since its inception in 1881. The science of preventative medicine is applied with intelligent efficiency and upon the most approved modern methods. Registration of vital statistics, bacteriological analysis and other subjects related to State medicine are under the direction or supervision of the State board of health. Independent of the Board of Health, both in action and organization, and yet properly regarded as agencies of the State's paternalism in respect to the public health, are the department of examination and registration of practitioners of medicine, auxiliary to which are the several boards of examiners designated by the state associations of doctors of medicine representing the several schools of practice, the similar board appointed by the state association of dentists,

and the commissioners of pharmacy and practical chemistry. The New Hampshire Medical College, established at Hanover in 1798, is a high class institution and practically a department of Dartmouth College.

*Public Libraries.*—New Hampshire has been a pioneer in and sturdy supporter of the library movement. Perhaps the earliest mention we have of it is in connection with a lottery in Portsmouth in the year 1750 in aid of an association library. From 1792 to 1883, 220 libraries received special charters from the legislature. These were mostly private library corporations which have now given place to, or become merged in the public library. The first free public library in the United States was established in Peterborough in 1833. The State was in 1849 the first to pass a law authorizing towns to aid in establishing and maintaining public libraries. This was followed logically by the second and third steps in the progress, namely, by the law of 1891 granting State aid to town libraries, and by the compulsory law of 1895, requiring every town to appropriate a certain proportion of its taxes for the support of a public library. The first legislative incorporation of a State library association was by New Hampshire in 1889. There are about 300 public libraries reported. The number of books contained in them and accessible to the public, exclusive of reports and pamphlets, is 900,000. The State Library now occupies a separate establishment and has a collection of nearly 100,000 volumes.

*Education.*—Since 1885 the common schools of the State have been organized on the town district system. Attendance from 8 to 14 is compulsory. In the school year of 1908 the total enrolment of pupils was 64,036, or about 75 per cent of the school population. The average number of days for the year was 159.1, and the number of teachers 2,999. The total value of school property was estimated at \$5,000,000. The State Normal School was established in 1870, and is located at Plymouth. Its attendance is now about 150. There are 30 academies and seminaries, and 3 colleges: Dartmouth, founded at Hanover, 1769; New Hampshire College of Agriculture and Mechanic Arts, at Durham; and Saint Anselm's College, at Manchester. Among the secondary schools of national reputation are Saint Paul's at Concord and Phillips Exeter. The cities and larger towns all have high schools supported by the public taxes and revenue. Seventy-one seminaries, academies and high schools are registered by the State Superintendent of Instruction as equipped to provide college preparatory courses. Tuition, text-books and all school supplies are free to the pupils to the completion of the high school course. Parochial schools are in successful operation in many places under the control and patronage of the Roman Catholic Church.

*Military Affairs.*—Between 1675 and 1762 the people of New Hampshire participated in six wars against the French and Indians, aggregating a period of 38 years. The frontier position of the State made it peculiarly exposed to attack by the Indians, from whose ravages it suffered severely. The State contributed 500 men toward the siege of Louisburg, and the same number for the operations at Crown Point in 1755, and at other times in this war 2,600 more soldiers. In 1775 the population of the colony

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was only 82,200. In the province militia establishment there were 13 regiments of foot and 1 of cavalry, besides special organizations of cadets and of artillery. The capture of Fort William and Mary in Portsmouth Harbor, under the leadership of John Langdon and John Sullivan, occurred 13 Dec. 1774, over four months before the battle of Lexington. The powder which was taken on this occasion later supplied the patriot army assembled about Boston, and was returned to the British in a different form at the battle of Bunker Hill, so-called, where New Hampshire men constituted over one half the Americans actually engaged. The passing of royal authority in the province was attended with very little commotion, and comparatively no manifestation of violence. The convention of 21 April 1775 caused a reorganization of the militia in August of that year, and in 1777 the number of regiments had been increased to 17. The number of men enrolled in 1775 was 16,710, and this comprised practically all residents of military age in the State. In that year three regiments were raised for service in the continental field. One regiment was in Canada; 33 companies under Colonel Wingate were guarding the sea-coast; 2 companies of men from this State were detached from Washington's army and accompanied Arnold in his famous march through Maine to Quebec, Coos and the Connecticut Valley were guarded, while 31 companies were raised to replace the Connecticut men who declined to remain longer at the siege of Boston. Undoubtedly more than 5,000 of the men of this State were in the field in 1775. In 1776 the three New Hampshire regiments of the Continental line were continued and strengthened, distinguishing themselves in the Canadian service, at Trenton and Princeton. Sullivan for superior conduct in bringing the unsuccessful American forces out of Canada in 1776, in the face of formidable difficulties, was made a continental major-general. Bedel led a new regiment into Canada, while one regiment was transferred from the coast to the aid of Ticonderoga, and four more regiments reinforced the patriot army at different points that year. New Hampshire's contributions reached high water mark in 1777. In May large bodies of organized militia marched to the relief of Ticonderoga. The regiments in the continental line remained in service and distinguished themselves at Stillwater, Saratoga, and other critical points. Stark's brigade at Bennington struck the blow which decided the fate of Burgoyne's invasion. When Stark's men returned to their farms and harvests, Whipple's brigade was forwarded with promptitude and energy to reinforce the northern army under Gates. Meanwhile Stark assembled another force of New Hampshire volunteers and with them was in season in this, his second campaign of the year, to complete the investment of Burgoyne along the Fort Edward fords. A number of New Hampshire companies also served against Burgoyne in Vermont organizations. In addition a regiment was sent to the aid of Rhode Island. The winter of 1778 found the New Hampshire men of the continental line at Valley Forge, and in the summer Whipple's brigade took part in the Rhode Island campaign under General Sullivan. In the remaining years of the war New Hampshire contingents served where the exigency of the contest led them, from the northern

frontier to Virginia, bearing themselves with valor and effectiveness at Monmouth, against the Six Nations, and acting an important part in the campaign which culminated in the surrender of Cornwallis at Yorktown. One New Hampshire regiment, at least, and possibly two, and John Stark, who had been made a continental brigadier-general after Bennington, continued in the regular or permanent continental service under Washington or in other important commands until the end. Among the New Hampshire statesmen whose names must always stand high on the records of revolutionary service and achievement are Weare, Langdon, Livermore, Bartlett, Dudley and Gilman, and conspicuous also in military fame are Sullivan, Stark, Poor, Scammell, Whipple, Cilley and Dearborn. It is not improbable that of approximately 17,000 men in New Hampshire then capable of bearing arms, about 20 per cent of the total population, nearly every man was in active service, and, many of them, through repeated terms of enlistment; and in that seven years of struggle, no armed enemies in visible organization crossed the boundaries of the Granite State.

*War of 1812.*—Early in the War of 1812 Portsmouth was fortified and garrisoned, and the northern frontier guarded by a company at Stewartstown. Many New Hampshire men distinguished themselves in this war, among whom was Major-General Henry Dearborn, the Revolutionary war veteran, and Major-General Eleazar Wheelock Ripley, later a member of Congress for Louisiana.

*Mexican War, 1846-8.*—Upon the outbreak of the Mexican War the State responded with spirit to the calls of the President, and promptly forwarded its quota. Franklin Pierce was a brigadier-general, and participated in Scott's campaign. Several New Hampshire men who later became prominent in the war for the Union began their military career at this time.

*War of 1861-5.*—In the war for the Union, 17 full regiments of infantry were sent into the service from New Hampshire. The State also contributed a battalion of cavalry, afterward enlarged to a regiment, a part of a separate (17th) regiment, united with the second, three companies of sharpshooters, a battery of light artillery, and a regiment of heavy artillery. Besides these it furnished a liberal number of men for the navy. The total number in the service was 32,750, or 10 per cent of the whole population. Their record was long and brilliant. The first Kearsarge was a New Hampshire ship. A good number of marines and sailors and a long array of worthy naval officers represented the State in that branch of the public service.

There were no military leaders in this war, residents or natives, of New Hampshire, who would be assigned to the class in which Grant, Thomas, Sherman and Sheridan stood. On the civil side, however, both in the war period and in the reconstruction years, natives and residents of this State were conspicuous at the very fountain heads of power and influence. In the Senate Wilson, a native of Farmington, was chairman of the committee on military affairs, Hale, naval affairs, Fessenden, native of Boscaawen, finance and appropriations, Grimes, native of Deering, District of Columbia, Z. Chandler, native of Bedford, commerce, and Clark, claims and president *pro tempore*. In the cabinet suc-



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1. Star Island Isles of Shoals.

2. Bethlehem, White Mountains.



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cessively holding the treasury portfolio were Dix (Boscawen), Chase (Cornish) and Fessenden. Greeley, native of Amherst, was the greatest intellectual force in the journalism of that day. Dana was assistant secretary of war. Dix, Butler, native of Deerfield, John G. Foster, native of Whitefield, and Fitz John Porter, native of Portsmouth, were major-generals. Walter Kittridge, author of 'Tenting on the Old Camp Ground,' and Charles Carleton Coffin, who was the historian of the war for the youth of the land, were of the Granite State. In the naval service were John G. Walker, Belknap, Parrott, Pearson, Storer, Wyman, Pickering, Prentiss, Browne, Long, Miller, William S. Walker, Perkins, Spence, Thornton, Park, and Craven. In the years immediately following the War, Zachariah Chandler, W. E. Chandler, Marshall Jewell and Amos T. Akerman of the New Hampshire stock were called to the cabinet, Horace Greeley and Benj. F. Butler were named for the presidency, and Salmon P. Chase ended a notable career as chief justice of the Supreme Court of the United States.

*Spanish-American War, 1898.*—In the war with Spain New Hampshire's quota, a full three battalion regiment of infantry, though filled with promptitude, was not called upon to go farther than the concentration camp at Chickamauga. This regiment was commanded by Robert H. Rolfe. General Leonard Wood was a native of New Hampshire, as were Admiral Asa Walker and other distinguished naval officers.

*National Guard.*—This organization has a brigade formation. There are now two regiments of infantry, each of 12 companies, in battalion arrangement; a four gun light battery; a troop of cavalry; signal corps; hospital corps; and two regimental bands—109 officers, 48 musicians, 1,175 enlisted men—total 1,332.

*History.*—Three of the four original towns, Portsmouth, Dover, Exeter and Hampton, occupied the interesting position of independent democracies between 1622, the year when Thomson's indenture was drawn and the first settlement definitely planned, and 1643, when they had all become, by their own choice or the necessities of their situation, constituent parts of the Massachusetts Bay Colony. This was the first union with Massachusetts Bay, and was conditional on certain important privileges and guarantees accorded to the towns by the Massachusetts General Court. The history of the period of this union is in a large measure identical with that of Massachusetts Bay. In 1679 the Masonian heirs succeeded in procuring in the home government orders for the establishment of a separate province for these four frontier towns. John Cutt, a merchant of Portsmouth, was the first President, as the chief magistrate was then styled. The four towns were made a part of the Dominion of New England in 1686. This government under Dudley and Andros survived only three years. From the spring of 1689 to the latter part of the winter of 1689-90 the New Hampshire towns governed themselves in the independent democratic fashion of the first period of their history. A second union with Massachusetts Bay was then effected and continued for two years. In 1692 the province government by royal commission was re-established and subsequently administered by appoint-

tees of the crown until 1775. With the governor was associated a lieutenant governor, and a council appointed by the king. The legislative function was vested in a general assembly constituted of the governor, the council, and the deputies, elected by freeholders. The right of veto was committed to the governor and the right of confirmation and disallowance of laws remained with the crown. From 1699, when the Earl of Bellomont assumed office, to the termination of Belcher's administration 1741, this province and Massachusetts had the same governor. The provincial assembly was continued until the departure of Governor John Wentworth in 1775. A succession of conventions beginning with that of 21 July 1774, finally resulted in the formal organization of a legislative body on a full representation of the people in view of the apparent necessity of establishing a new state government. The people of New Hampshire entered upon the active stages of a national movement for independence with deliberation and unanimity. Perhaps no one of the colonies was so free from the so-called loyalist element as was this. The "Association Test" put every man on record, either for or against the common cause. The original files are preserved, and the names of those who dissented or refused to take an unequivocal position constitute a surprisingly meagre list.

The civil government of New Hampshire from the time of the departure of Gov. Wentworth to the organization of a new form of government in June 1784, under the constitution of 1783, was purely legislative. The constitution of 1776, probably the first adopted by either of the thirteen States, by its own independent action, was a brief instrument and evidently intended to be temporary, or, as it was officially stated at the time, "to continue during the present, unhappy and unnatural contest with Great Britain." It was adopted and promulgated by the fifth convention, chosen in the latter part of 1775, and it was never submitted for acceptance or rejection to (or formally ratified by) the people. During the period of the Revolution the administrators of the New Hampshire government were embarrassed by a serious defection in the western part of the State, and particularly in Grafton County. Many of the leading men of the Connecticut River towns were from Connecticut, and their ideas of government were naturally in accordance with their education and experience in the commonwealth from which they had emigrated. The form of government temporarily adopted by the Fifth Provincial Congress was not acceptable to the majority of these people. The group of towns which included Gunthwait on the north and Lebanon on the south in Grafton County organized themselves into associations for purposes of civil and military government, and formally declined to recognize the new state government of New Hampshire. The contention of the "New Connecticut" party, so called, was, that upon the dissolution of political relations between the colonies and the mother country, and more especially in respect to the territory in controversy between New York and New Hampshire, the towns, being the political units, and the original source of political authority, were invested with the right to determine for themselves the question whether to accord



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allegiance to one or the other of the disputing States, or whether to erect themselves into an independent State. They urged that inasmuch as the constitution of 1776 had never been submitted to the people, or to the towns for ratification, and had been accepted by a part of the towns only, it was operative only upon such as had elected to ratify its provisions. Their argument was presented with great skill and effectiveness, and although the movement ultimately failed to accomplish its purpose, its sponsors succeeded in making themselves felt as a political force to be reckoned with by three established States, and the Continental Congress, as well as the prospective commonwealth of Vermont. In 1783 a new State constitution, modeled closely upon the Massachusetts constitution of 1780, was adopted, which, except as modified by the amendments emanating from the subsequent conventions of 1791-2, 1850, 1876, 1880, and 1902, still remains in force. In 1787 a Federal convention formulated a constitution for the United States of America. At this critical time the Constitution became the organic law of the new nation on its ratification by New Hampshire, the ninth State, in June 1788. John Langdon of New Hampshire was chosen president, *pro tempore*, of the first session of the United States Senate under the new Constitution, and to him fell the honor of informing Washington of his election to the presidency. In the years immediately ensuing the Federalist party was evolved and was in political control at an early date in this State, but gave place to the Anti-Federalists, then known as Republicans—the Jefferson party of that day—from 1805 to 1812 (both of these years inclusive,) except 1809, when Jeremiah Smith, Federalist, broke in upon the succession as Governor. In 1813, 1814, and 1815 the Federalists were again in control of the State. In 1816 they met with irretrievable defeat, and thereafter the Jeffersonian Republicans remained in power, excepting in the brief period of a temporary reverse in 1846, until permanently overthrown in 1855 by the American party, more commonly called the "Know-nothings." The earlier part of this period was one of ecclesiastical agitation. The people of New Hampshire had become in the later colonial period almost entirely Congregationalists, and that denomination had maintained its ascendancy as practically a state church during a long period, the town ministers being called by the church, approved in town meeting and supported by public taxation. Universalists, Baptists, Methodists, and Free Thinkers had now become potent enough to assert themselves effectively in politics, and the contest reached its culmination in the so-called toleration act of 1819. Hosea Ballou, a New Hampshire minister, was the founder of Universalism in its modern form, and Benj. Randall, another minister of this State, was the founder of the Free Baptist denomination. The latest New Hampshire contribution to religious denominationalism is Christian Science, the founder and chief exponent of which is a resident and native of this State. In this year, 1819, also, was decided the historic Dartmouth College case, which Senator Lodge described as one "in its effects more far-reaching and of more general interest than perhaps any other ever made in

this country." Through this futile attempt by the State to amend the charter of Dartmouth College for the purpose of reorganizing the government of the institution, inviolability of charters never before enjoyed was secured. Incidentally the case served to make prominent and to bring into the view of the whole country the fact that in Daniel Webster, Jeremiah Mason, Jeremiah Smith, Ichabod Bartlett, and their compeers, there was at the bar of New Hampshire, and on the bench of her highest court, a group of jurists whose law learning and forensic ability could not be surpassed at that day in the entire length of the Union.

In 1826 occurred the anti-Masonic uprising, which drifted into politics, and for a time commanded serious attention. The second quarter of the 19th century was remarkable for the number of men of New Hampshire birth and residence who held commanding positions in shaping the destiny of the republic. The names of Webster, Cass, Woodbury, Pierce, Kendall, Chase, Hale, Atherton, Clifford, Tuck, and Greeley constitute a conspicuous part of a long list that might be enumerated.

The years following 1846 were marked by the development of a strong reform sentiment especially in the cause of temperance and on the slavery question. In case of the former, the movement resulted in the prohibitory law 1855, which became the accepted principle of liquor legislation until at length a reactionary sentiment expressed itself in the license act of 1903. The slavery movement found many earnest and devoted adherents, intense and uncompromising in their propaganda. The Free-soil vote had already appeared in 1841, and continued to be of more or less importance until 1856. Until 1806, with the exception of a significant, and with many of its participants, permanent revolt from the Republican party in 1872, political alignments had been strictly maintained, and political contests had usually had more or less of the hazard of uncertainty. The Free-silver agitation of 1896 found New Hampshire voters strongly in favor of the gold standard, and led to many transfers of party allegiance. Since 1856, the Republican party has had control of every department of the State government and carried every State election except in the years 1871 and 1874.

In the constituents of population, the descendants of the original New England stock still predominate. From an early date, however, there have been at intervals important additions of Irish Presbyterians and Irish Catholics. The representatives of this race from both its sectarian branches, have been speedily assimilated and are adepts at leadership in business, the professions and public affairs. The German immigrants manifest the same assimilative tendencies. The Canadian French are becoming also an important part of the population. They adapt themselves with facility to trade, agriculture, mechanics, and as operatives in manufacturing establishments. They are represented in all the learned professions, but more numerous in the priesthood and medicine. The activities and resources of the State, religious, benevolent, commercial, industrial educational, and productive, as manifested in visible results, were never in more satisfactory adjustment having reference to a fair and reasonable dis-

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tribution of burdens and benefits than to-day; and the State government in all its branches is administered in conformity with such principles as to command the respect and approval of the governed.

A. S. BATCHELOR,  
*Editor of State Papers, Littleton, N. H.*

**New Hampshire College of Agriculture and Mechanic Arts**, opened in 1867, at Durham, N. H. The courses offered include the regular four years' courses in agriculture, mechanical and electrical engineering, technical chemistry, and general science, for completion of which the degree of B.S. is conferred; a two years' course in agriculture; and ten weeks' winter courses in agriculture and dairying. There is also a preparatory department; and the State experiment station is connected with the college. Women are admitted to all courses, but form a small proportion of the student body. The income of the college is derived from the Federal land grant of 1862 and from Federal and State appropriations; in 1910 the total amounted to \$181,000; the students numbered 452 (93 women), and the faculty 35.

**New Han'over**, an island of the Bismarck Archipelago (q.v.), about 40 miles long and 20 miles broad, northwest of New Ireland, or New Mecklenburg (q.v.), from which it is separated by Byron Strait.

**New Harmony, Ind.**, town, in Posey County; on the Wabash River, and on the Illinois Central railroad; about 25 miles in direct line northwest of Evansville. The first settlement was made by a German community called Harmonists (q.v.), in 1815. In 1824 Robert Owen purchased the village and domain and the Harmonists returned to Pennsylvania. The next year Owen established a "Preliminary Society" and issued a general invitation to all "the industrious and well disposed of all nations" to join the new community which was to be governed and conducted on new plans. All goods were to be held in common, but their use was regulated by age; "moral lectures" were to replace religious worship; the young were to be educated by trained teachers, and this education was to begin when the children were two years of age. The whole experiment proved a failure; those who accepted the invitation were not all "well disposed" and many were far from "industrious." In 1826 Owen assumed control of the community and established order; but in a few months dissensions arose, three communities were formed of the original one, and soon after the "community idea" was abandoned. One of the leaders, William Maclure, purchased part of the land and established an industrial school which also was a failure. The free library of the Workingmen's Institute, established in 1838, is in a most flourishing condition and contains about 16,000 volumes. The town has some manufacturing establishments, chief of which are flour and lumber mills and brick works. Pop. (est.) 1,300.

**New Haven, Conn.**, city and county-seat of New Haven County, and the largest city in the State. It is popularly called "the City of Elms" from the magnificent elm trees planted there over 100 years ago. New Haven lies at the head of New Haven Bay, four miles distant from Long Island Sound. It is on the New

York, New Haven & Hartford railroad, 36 miles from Hartford and 74 miles from New York city.

**Topography.**—The city lies on a level sandy plain, bordered on the east and west by the West and Quinnipiack rivers. It has an area of 23 square miles. "The Old Green" is a public square in the centre of the city, about which the original settlers lived, and used at night as a corral for their cattle. It also for years was the public burial ground. The bones of thousands lie there to-day. Near the city limits rise East Rock and West Rock, 360 and 400 feet in height respectively, from the summits of which a fine view of the city and surroundings may be obtained. East Rock, which has been made into a park, is crowned at its summit by a monument dedicated to the Connecticut soldiers and sailors who fell in the Civil War. The entire park system in New Haven embraces nearly 1,200 acres. The sewer system is most complete, including 95 miles of sewer.

**Streets and Avenues.**—Chapel street, the business promenade, extends in a northwesterly direction throughout the length of the city. The homes and dwelling houses are generally surrounded by gardens, and many of them are almost hidden from view among trees. The number of magnificent elms with which the principal avenues are planted were mostly set out about the close of the 18th century by James Hillhouse, or through his influence and example. Early residents laid out the city with four streets running nearly north and south and four streets running east and west, thus dividing the city into nine squares each a quarter mile long, the central block being a public square, and roadways were built at various angles, with "The Old Green" as a common centre. In 1903 there were 225 miles of streets and avenues, of which 90 miles were paved.

**Prominent Buildings.**—Here is the seat of Yale University (q.v.), with its numerous halls, dormitories, schools and special buildings which are celebrated in educational and historical annals. The Yale Campus, which lies directly west of "The Old Green," is a rectangle containing two city blocks. A series of college buildings form an enclosed court about the campus. Two of these buildings, Vanderbilt and Osborn Halls, are among the chief architectural attractions of the city, though Woolsey Hall is the most beautiful of all the university buildings. The Sheffield Scientific School and the departments of law and medicine, are a little removed from the campus. The Hopkins Grammar School, founded in 1660, is also located here. Other buildings and institutions are the State Normal School; the Boardman Manual Training School; the Hillhouse High School; New Haven Hospital; Grace Hospital; Saint Francis Roman Catholic Orphan Asylum; the Public Library, containing 60,000 volumes; New Haven Orphan Asylum and the Young Men's Institute. Here are also the archives and libraries of the New Haven Colony Historical Society and the American Oriental Society.

**Churches and Schools.**—New Haven has 70 churches, some of which were built as early as 1800. In the old burying ground in Grove street are the graves of Noah Webster, Theodore Winthrop, Eli Whitney, F. B. Morse and other celebrities. The churches are divided among the following denominations: Congregational, 17;

## NEW HAVEN COLONY — NEW HEBRIDES

**Methodist Episcopal, 14; Protestant Episcopal, 12; Roman Catholic, 9; Baptist, 7; Lutheran, 4; Jewish, 4; and Universalist, Unitarian, and others.** There are 40 public school buildings in the city, with a daily attendance of 20,000. The school system is maintained at a cost of \$380,000 annually.

**Trade and Commerce.**—New Haven up to the middle of the 19th century was an important ship-building centre, but this industry has gradually diminished. Ship-building interests were seriously crippled by the Embargo (q.v.) and the War of 1812. There is an excellent natural harbor here which has been improved and enlarged at State and Federal expense. New Haven has two lines of steamships to New York and is the commercial and distributing centre for a large section of the State. In manufacturing New Haven ranks first among Connecticut cities, and has many and varied industries, including clocks, watches, hardware, fire-arms, ammunition, wagons, carriages, engines and boilers, automobiles, rubber goods, wearing apparel, iron foundries, machine shops, canneries and packing houses. The headquarters and repair shops of the New York, New Haven & Hartford railroad are also located here. According to the last census, New Haven industries represent a capital of \$30,464,000, with an annual production valued at \$40,762,000. Over 20,000 persons are employed in the 1,300 factories of the city and over \$12,000,000 are annually paid in wages. The city has a dozen national banks, and numerous trust companies, state banks, savings banks and buildings and loan companies.

**Government.**—The city maintains municipal government under a special charter of 1897, which controls all municipal affairs including the old school district of New Haven; but the 13th ward of New Haven, Westville, is independent of the city in the management of its schools. A mayor, elected every two years, is the city's chief executive, and he has the power to appoint a majority of the municipal administrative officers. The city affairs are administered by a board of aldermen of 21 members, which appoints the assistant city clerk. The sheriff, city treasurer, collector of taxes, city clerk and comptroller are elected every two years by popular vote. The board of selectmen consists of seven members elected for the purpose of admitting electors to the voting privilege. The administration of the school district is in the hands of a Board of Education of nine members, appointed by the mayor. The fire and police departments of the municipality are managed by Boards of Commissioners, the latter bi-partisan. The central clearing house is the Board of Finance, which fixes the rate of taxation and makes the appropriations.

**Municipal Finances.**—The assessed valuation of real and personal property in 1910 was \$126,889,936, including exemptions. The provided debt of the city amounted to \$3,873,430. The city expends each year for maintenance and general expenses \$1,415,000; of which the largest item is \$380,000 for schools; police department, \$190,000; fire department, \$150,000; interest on provided debt, \$140,000; street cleaning, \$90,000; lighting, \$80,000; charity, \$75,000.

**History.**—New Haven was settled in 1638 by

a company of Puritans chiefly from London under Theophilus Eaton, their first governor, and the Rev. John Davenport. It was a distinct colony until 1660, when after a protracted struggle it was united with Connecticut under the charter of 1662. It was incorporated as a city in 1784. In its earliest days New Haven was called Quinnipiack by the Indians. It was also called Roodenberg by some of the early colonists. The Indian chief Momanguin sold a large tract of land here to the London company, receiving in return an assortment of coats, hatchets, spoons and knives. Treaties were signed by both parties, the Indians agreeing not to "terrify, disturb or injure" the settlers, who in turn promised to protect the Indians, and allow them to hunt in portions of the ceded territory. Another tract 10 miles wide by 12 miles long was purchased six months later, and in June 1639 a fundamental and written constitution was adopted by the settlers. The privilege of voting and holding office was strictly limited to church members. In both civil and church affairs the Bible was the only recognized law.

Theophilus Eaton, the first governor of the New Haven Colony, was re-elected and retained the office until his death in 1658. The city of New Haven was incorporated in 1784 and Roger Sherman was its first mayor. He was mayor and United States Senator when he died. The boundary of the Connecticut Independent Colony under its charter of 1662 embraced the towns of Milford, Stamford, Guilford and Branford known as the "New Haven Colony," and in 1665 the New Haven towns submitted to the Connecticut charter. In 1701, New Haven was made a joint capital with Hartford, and remained as such until 1874. Yale College was removed from Saybrook to its present site in 1717. The town was captured 5 July 1779 by a British force under Gens. Tryon and Garth after a sharp skirmish. In this engagement the Americans lost 29 killed and 17 wounded, while the British loss was 70 killed and 40 wounded. After its incorporation as a city New Haven began to make rapid strides. Steamboat communication was opened with New York in 1815, and the first railroad entered the town in 1830.

**Population.**—In 1800 New Haven had a population of 4,049; (1850) 20,345; (1870) 50,840; (1880) 62,882; (1890) 81,298; (1900) 108,027, including 30,000 of foreign birth and 2,800 of negro descent. The population in 1910 was 133,605.

**Bibliography.**—Atwater, 'History of the City of New Haven' (1887); Barber, 'History and Antiquities of New Haven' (1870); Bartlett, 'Historical Sketches of New Haven' (1897); Lambert, 'History of the Colony of New Haven' (1838); Levermore, 'Republic of New Haven' (1886); and 'Papers of the New Haven Colony Historical Society' (1865-1902).

N. G. OSBORN,

Editor 'The New Haven Register.'

**New Haven Colony.** See NEW HAVEN, CONN.

**New Hebrides,** *Nēb'ri-dēz*, a group of islands in the South Pacific, east of Australia, extending from lat. 13° to 20° S., and from lon. 165° to 170° E.; area, about 4,900 square miles. The largest ones are Mallicollo, and Espiritu Santo (q.v.). Tanna has an active volcano; and in consequence probably of vol-

## NEW IBERIA — NEW JERSEY

canic action, Aurora, one of the most fertile, sank out of sight in 1871. Some of the group are of coral formation. They are all wooded and hilly; ebony and sandalwood being obtained; their chief products are yams, bananas, cocoanuts, and sweet potatoes. The chief animal is a small pig, not larger when full-grown than a rabbit. The native inhabitants, belonging to the Papuan race, are in general degraded and very ferocious, except on Aneityum, where there are Christian missions, and where the majority of the inhabitants can read and write. These islands, according to the Anglo-French convention of 1887, are under the control of a mixed commission of French and British naval officers. The population is decreasing; in 1910 it was less than 50,000.

**New Iberia**, i-bé'ri-ā, La., town, parish-seat of Iberia Parish, on the Bayou Teche, and on the Southern Pacific railroad; about 100 miles in direct line west of New Orleans. A short railroad extends to Avery Island, where there is a valuable salt-mine. It is in a fertile agricultural section, in which the chief products are the pepper, from which tabasco sauce is made, cotton, sugarcane, corn, rice, vegetables, and berries. It has considerable manufacturing; some of the industrial establishments are machine-shops, a knitting-mill, ship-yards, foundries, wagons, brick works, soap factories, cottonseed-oil mills, factories for different lumber products, and tabasco sauce factory. The town is in a section of the State mentioned by Longfellow in 'Evangeline.' It has a government building, a city-hall, and a large public market. Its educational institutions are the public and parish schools for white and colored children, a high school, and a public high school library. The city owns and operates the electric-light plant and the waterworks. Pop. (1890) 3,447; (1900) 6,815; (1910) 7,499.

**New Ireland.** See **NEW MECKLENBURG.**

**New Jersey**, the "Garden State," and one of the original 13, adopted the Federal Constitution, by unanimous vote, in convention 18 Dec. 1787. The State is bounded on the north and east by New York and the Atlantic Ocean, on the south and west by Delaware and Pennsylvania. Of the 487 miles of total frontier, only 48 miles are defined by natural boundaries. Capital, Trenton. Area, 8,224 square miles, of which 710 square miles is water surface. The extreme length of the State is 166 miles, the narrowest portion being 33½ miles. Pop. (1910) 2,537,167.

**Topography and Geology.**—The topographic features and geological structure of the State are intimately related and are explanatory of the surface conditions. New Jersey is characterized as being on the Atlantic slope of the continent and is divided into four topographic zones: (1) Appalachian, including the Kittatinny Mountain and Valley. (2) Highlands. (3) Red sandstone or Triassic area. (4) Coastal plain.

The Appalachian zone includes the Kittatinny or Blue Mountain and the Kittatinny Valley, occupying the northwestern portion of the State. This range is level-topped, narrow, rough, rocky and heavily wooded. It extends across New Jersey from the New York State line, where it is known as the Shawangunk Moun-

tain, to the Delaware River at the Delaware Water Gap. At High Point, near the northernmost point of the State, it is 1,804 feet high, which is the greatest elevation of the State. The Kittatinny Valley, 10 to 13 miles wide, is shut in by the Kittatinny Mountain on the northwest and by the Highlands on the southeast. It is characterized by high, rolling hills and minor valleys, pleasing landscapes, and beautiful farming country. This valley is continuous, on the northeast, with the valley of Orange County in New York, and to the southwest stretches away into the great Cumberland Valley of the Atlantic slope of the continent.

The Highlands cross New Jersey in a general north-northeast and south-southwest direction. The surface of this zone is hilly-mountainous, and is made up of several parallel ridges, separated by deep and generally narrow valleys. The latter are like the Kittatinny Valley—smooth—and are largely cleared and in farms. The mountain ranges are remarkably uniform in height. This division may be considered as a seaward-sloping table-land, whose northwest side has an elevation of 1,000 to 1,500 feet above the ocean and its southeastern side 600 to 900 feet above the sea. In the northern part there are several lakes elevated amid the mountains—Hopatcong, Greenwood, Macopin, Splitrock, Green, Wawayanda, and Budd's being the more important of these natural upland sheets of water.

The Red Sandstone Plain or Triassic Area, also called the Piedmont plain, is bounded on its northern border by the Highlands. On the southeast, this third great topographic zone merges into the clays and marls of the coastal plain. It is 67 miles long and 30 miles wide at the Delaware River. The trap-rock ridges, known as Palisades, Watchung, Sourland, Cushetunk and other mountain ranges, rise abruptly above the general level of the sandstone plain. They are generally forested, whereas the sandstone country is nearly cleared and in farms. These mountains rise 400 to 900 feet above sea-level. The drainage is largely by the Hackensack, Passaic, and Raritan rivers and their tributaries.

The fourth zone, known as the coastal plain, includes all the country southeast of the Triassic sandstone area and borders the ocean. This zone is about 100 miles long from Sandy Hook to Salem City, and is 10 to 20 miles wide. The surface is hilly in part, but with gentle slopes, except where some of the streams have cut their way through its earthy beds and formed steep-sided stream valleys. The Navesink Highlands and the Mount Pleasant Hills are the highest lands in this zone. The drainage is by many tributaries westward into the Delaware, and by the Atlantic coast streams into the Atlantic Ocean. In the northwestern part of this zone there are clay beds and greensand marls, which make the outcrop on the surface in places; on the southeast there are sands, clays, and gravels, and fringing the sea a narrow range of sand hills or coastal dunes. Within the coastal plain lie the "Pines," a wooded area of so great an extent as to contribute largely to the forest acreage of New Jersey. In lots of 10 acres and over, there are 2,070,000 acres of woodland, with only 2,000,000 acres of im-

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proved land in farms. The famous sea-side resorts of the State fringe the coastal plain.

As set forth by Professor John C. Smack, the geologic structure of New Jersey is so related to the topography that observations concerning the physical features give a satisfactory clue to such structure. All of the larger geological formations of the United States, except coal, occur in parallel zones, as has been indicated. These formations extend from northeast to southwest, and a section line across the State from Port Jervis southeast to the ocean crosses them nearly at right angles to their trend. The oldest geological formations in the State are the crystalline rocks of the Highlands. Granite, gneisses, and other crystalline schistose rocks and beds of magnetic iron ore make up the mass of these mountain ranges. These rocks are generally much tilted in position, almost on edge, and are also much faulted. They strike northeast and southwest and dip to the southeast or northwest. The iron ores and zinc ores which are mined in the State are found in these formations. The granite, gneiss, and crystalline limestone or marble, used in building, are also from these Highland formations.

The Palæozoic rocks are found in the valleys included in the Highlands, in the Kittatinny Valley and Kittatinny Mountain, and in the Green Pond and Copperas Mountains. Cambrian, Silurian, and Devonian are represented, and the rocks are limestones, slates, sandstones, and silicious conglomerates. The magnesian limestones and the slates constitute wide belts in the Kittatinny Valley, the Musconetcong, Pohatcong, Pequest, and other valleys. The Kittatinny Mountain mass consists of sandstones and conglomerates of the Oneida and the Medina epochs of the Silurian age. In the valley of the Upper Delaware, west of this mountain, there are narrow belts of waterlime, Lower Helderberg, and Upper Helderberg, fossiliferous limestones, with Marcellus shale as the highest member of the Devonian within the State. The Green Pond Mountain rocks also have been referred to the Oneida horizon. The limestones and slates are the formations on which the rich wheat lands of Warren County and the dairy farms of Sussex are situated. Stone for building, slate for roofing and flagging stone, and limestone for lime and cement, are quarried in the Palæozoic areas. Copper, lead, and zinc ores, and barite, limonite, or brown hematite, and glass sand have been worked in many localities.

The red shales and sandstones and the included trap-rocks of the northern-central part of the State are referred to the Jura-trias of Mesozoic time. The sandstone beds dip in general toward the northwest, at a low angle of inclination in the sandstone. The erupted trap-rocks form long ranges of steep-sloping hills or mountains, often crescentic in form. A great deal of excellent sandstone for building and stone for road-making is quarried in this formation. Copper ores occur in the sandstone near the trap-rock or at their junction. Barite also has been mined in the sandstone at one locality.

The cretaceous rocks of the State include the clay district of Middlesex County and the greensand marl developed in Monmouth County, and thence southwest to Salem County. A large amount of clay is dug in the Raritan clay dis-

trict. The greensand marl, dug in shallow pits generally, and in numberless localities, has had a wide use locally as a fertilizer.

The formations of the coastal plain zone, later than the cretaceous beds, are greensand marls of the Eocene, clays and sands of the Miocene, and the clays, sands, and gravels of the post-Tertiary. They are recognized in a fourfold division, and are known as Beacon Hill, Bridgeton, Pensauken, and Cape May formations. Clays and sands for brick, terra-cotta, and pottery, marls for fertilizer, glass sands, and gravel for road-building are dug in these formations.

In the northern part of the State there are surface formations of glacial epochs, and the terminal moraine of the last glacial ice is traced from Perth Amboy by Morristown and Hackensack to Belvidere on the Delaware.

Alluvial deposits of recent time are recognized in the river valleys and in the tidal marshes and in some of the fresh-water swamps.

*Economic Geology.*—To the early settlers the mineral wealth of the State was well known. Before the Revolution, copper, "bog" iron, brick clay, and glass sand were exploited. At the present time, the copper ores are not worked, owing to their low grade. Copper is distributed throughout the red sandstone zone. Of the iron-mining industry, the magnetic iron ores form the basis. In 1908 the production of pig iron amounted to 225,372 long tons, valued at \$3,370,000. In 1908 there were 17 blast furnaces in New Jersey, of which three were in blast and eight out.

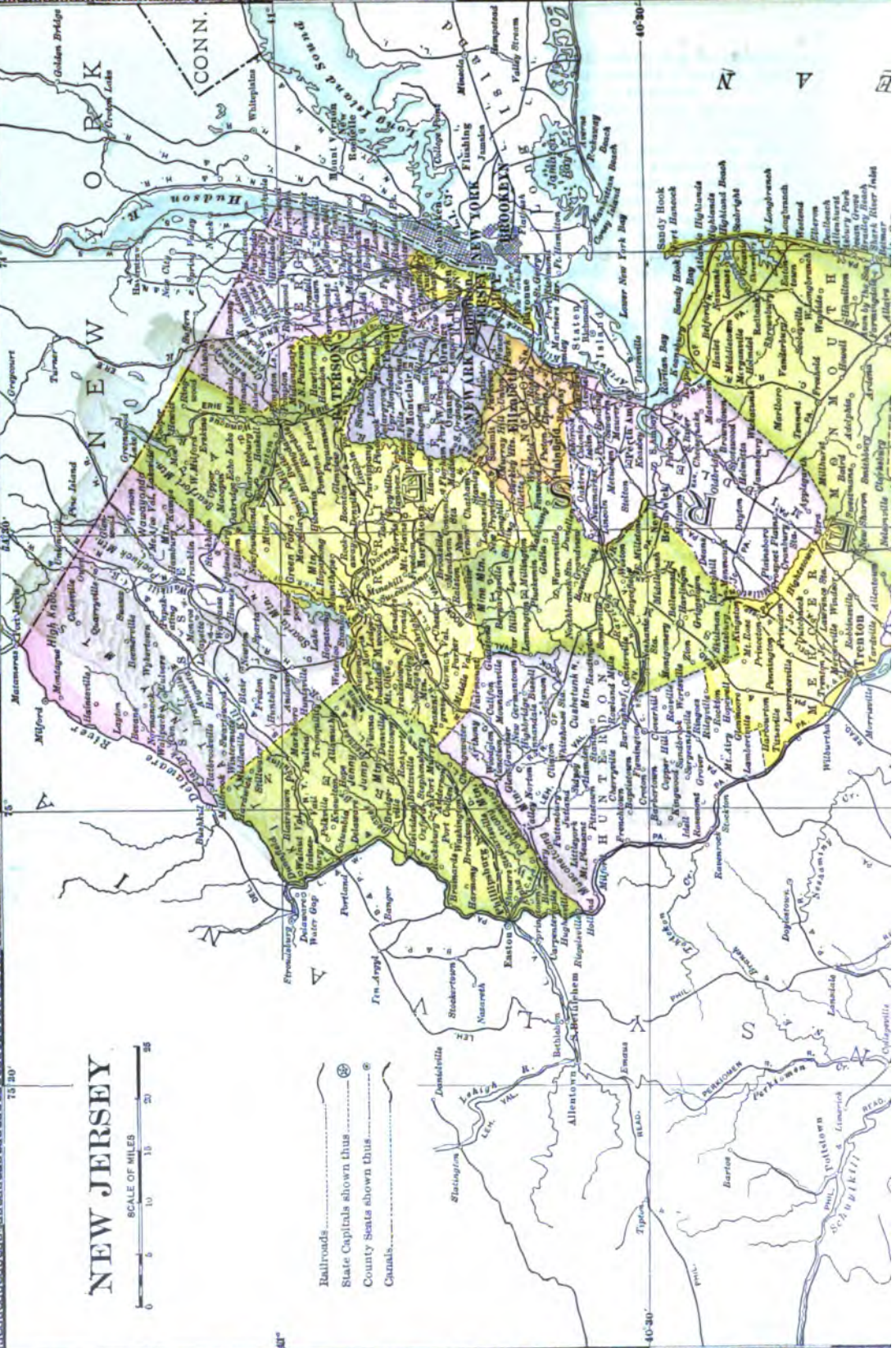
The yearly output of zinc amounts to about 200,000 tons, ores being red oxide, silicate, and franklinite. The zinc deposits of Ogdensburg and Franklin Furnace in Sussex County are the most famous, although other localities where zinc blende occurs have been exploited, but have not been developed into mines. Lead in the form of galena has been mined in Sussex County. Arsenical and nickeliferous pyrites also occur. Graphite is disseminated widely in the crystalline schistose rocks of the Highlands. Molybdenum occurs in form of molybdic sulphide at the Ogden mines and at the Hude mine, Sussex County, but is not worked. Barite has been found in quantity for mining near Newton, Sussex County, and at Hopewell, Mercer County.

Clays are found throughout New Jersey. There are numerous beds of fire-clay, stoneware or potter's clay, and clay used in the manufacture of paper, terra-cotta, pipes, and bricks. The district at the mouth of the Raritan River produces, for its own establishments and more distant points, a vast tonnage of fire and ware clay. The large openings are near Woodbridge, Perth Amboy, Sand Hills, South Amboy, Sayreville, and Cheesequake. Clays for ware and for terra-cotta are obtained at various points, notably near Trenton and at Palmyra. Fire-clays are found along the line of the New Jersey Southern Railroad, large works being located at Winslow.

Brick-earth, or brick-clay, is found in thick beds along the Raritan River and Raritan Bay, along the Delaware, on the Hackensack, and there are very large brickyards on these navigable tidal waters, which make a large part of the brick used in structural work in New York





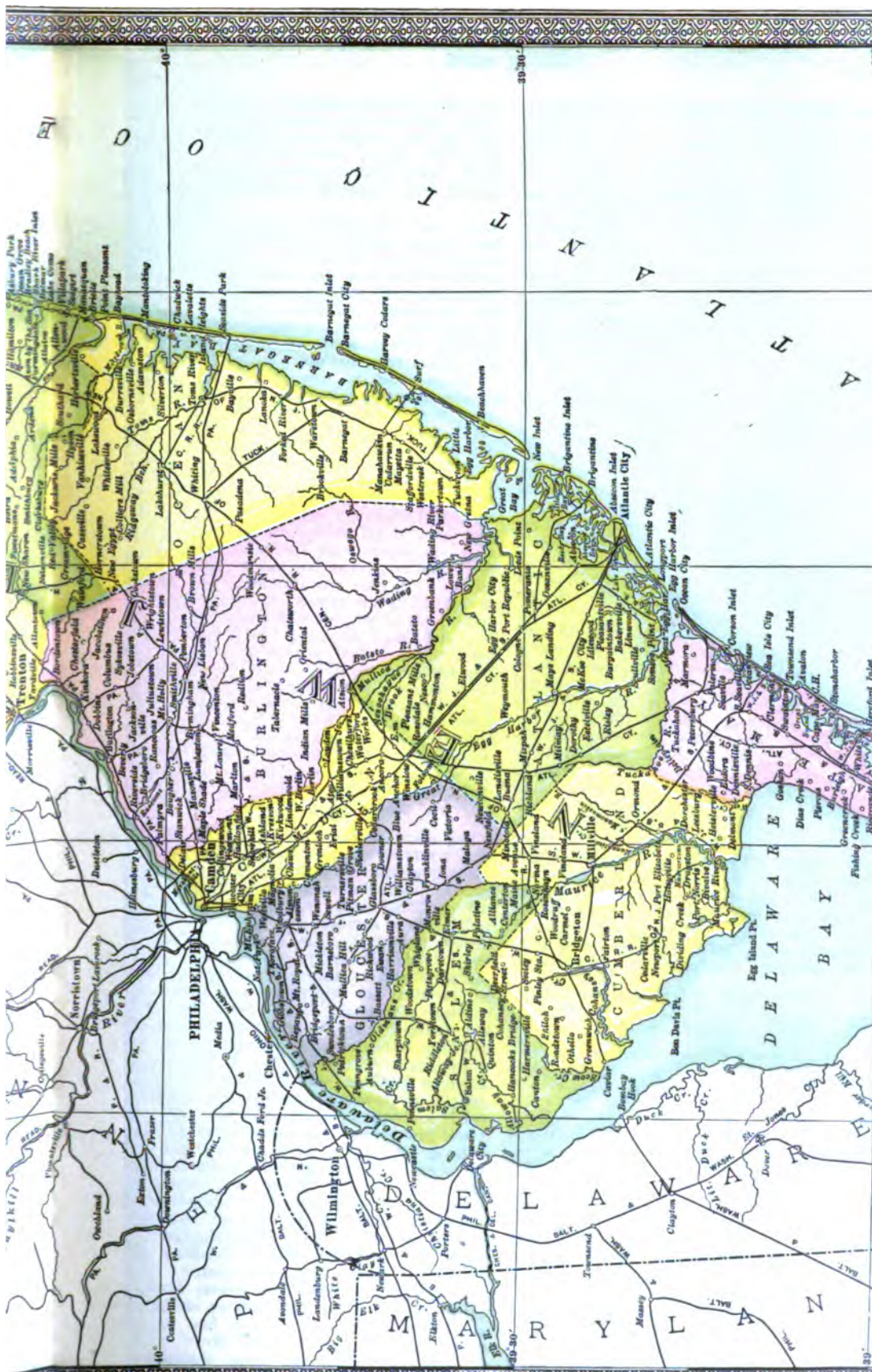


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- Railroads.....
- State Capitals shown thus (star symbol)
- County Seats shown thus (circle symbol)
- Canals.....









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and Philadelphia. Fire-sand, kaolin, and feldspar, as well as fire-clay, are also dug extensively in the Raritan clay district and put into fire-brick. In 1908 the value of the clay products of the state amounted to \$12,313,696. Brick and tile was valued at \$6,363,705 and pottery at \$5,949,991.

Of building stone, granite has been quarried at Charlottenburg in Morris County, and Pochuck Mountain, in Sussex County, Gneisses, for heavybridge work, are quarried at Dover. Sandstone quarries at Avondale, Newark, Paterson, Little Falls, Haledon, Stockton, and Greensburg, or Wilburtha, produce brownstone for cut work, while trap-rock, widely distributed and accessible to railroads and canals, has been most successfully used on State roads.

The marbles of the State are not at present worked, while slate for roofing has been quarried at the Delaware Water Gap, and at Newton and Lafayette in Sussex County. Flagging-stone quarries are opened near Deckertown, in Sussex County; at Milford, on the Delaware, and at Woodsville in Mercer County. Portland cement is one of the important industries.

**Agricultural Interests.**—The staple crops produced in New Jersey are corn, wheat, rye, oats, buckwheat, hay, white and sweet potatoes. The values of these products for 1909 were as follows: corn, \$6,733,000; winter wheat, \$2,146,000; rye, \$1,018,000; oats, \$765,000; buckwheat, \$209,000; hay, \$9,009,000; potatoes, \$5,904,000. Of animals there are horses, mules, milch cows, other cattle and sheep. Horses are estimated to be valued at \$8,000,000, mules \$750,000, milch cows \$9,000,000, other cattle \$1,275,000, sheep \$200,000. The wool clipped in 1909 was about 176,000 pounds. The acreage under cultivation for 1909 is given as follows: corn, 290,000 acres; winter wheat, 110,000 acres; oats, 60,000 acres; rye, 79,000 acres; buckwheat, 13,000 acres; hay, 437,000 acres; potatoes, 80,000 acres.

Possessing a great diversity of soils, and a somewhat notable variation in temperature, New Jersey has ever occupied a distinctive position as an agricultural community. The average yearly temperature ranges from 49.6° in the Highlands to 53.0° on the sea coast. The average annual precipitation, including melted snow, is 47.18 inches in the Highlands, and 45.92 inches on the sea coast. Aside from the staple crops, above mentioned, the fruits of the State have a large sale in the nearby markets of Philadelphia and New York. Peaches and apples are extensively grown in the northern and northwestern portions of the State, while pears are cultivated in the midland counties. These fruits are common, however, in all sections. The southern counties produce large acreages of strawberries, raspberries and blackberries, while cranberries are a staple product of boggy areas in Burlington and Ocean counties. Grapes are grown extensively in the southern section of New Jersey, while plums, cherries, and currants are common in all sections. Huckleberries are of spontaneous growth and are gathered in large quantities. In truck farming, watermelons and cantaloupes, the Hackensack variety of the latter competing with the Colorado product, are grown on the large plantations and small farms near Philadelphia and New York. Market gardening, owing to the reasonable price of land, and extensive

stone-road system, and quick, cheap, and safe transportation by rail and boat, is a profitable industry in New Jersey, more particularly in the vicinity of New York. Commercial floriculture gives to the State a preeminence. Dairying is largely confined to the northern, central, and southwestern portions of the State. The poultry farms of New Jersey are near the markets of Philadelphia and New York. The forest lands, including stump and brush lands to merchantable timber, of the State occupy about 2,000,000 acres; the cleared farm land about the same acreage; 1,200,000 acres of forest land is coniferous, pitch pine on the uplands and white cedar in the swamps. This is the region known as the "Pines" extending from Lakewood on the north to Cape May County on the south, and embracing a number of health resorts. The northeastern Highlands, with 210,000 acres, the Kittatinny Mountain with 58,000 acres, the Palisade Mountain with 11,000, are the remaining large forest areas. The forest products are worth about \$4,000,000 annually. Owing to a lack of interest and knowledge, an inherited desire to denude the surface of the earth and almost constant fires during dry seasons, the forests of New Jersey have been neglected and rendered unproductive to the last degree. During the colonial period, forest lands were not only of a relative but actually of a greater value than they are at present. The State renders directly and indirectly great assistance to agricultural interests by the media of an agricultural college located in New Brunswick, experiment stations, a board of agriculture, grange and horticultural society. Reports, institutes, and lectures are the means of disseminating information.

**Manufactures.**—The great manufacturing districts of New Jersey are located in the immediate vicinity of New York and Philadelphia. Within the limits of the city of Newark alone it is claimed there are made a wider variety of articles than in any other city in the United States. Newark is famous for leather, jewelry, hats, and celluloid, Paterson for silks and locomotives, Passaic for woolen and worsted goods, Jersey City for tobacco products and soap, Trenton for pottery of all grades, structural steel and iron and rubber goods, Camden for shipbuilding and chemicals, Elizabeth for sew-

	No. of establishments	Persons employed	Capital invested
Bricks and terra-cotta..	66	6,600	\$ 7,000,000
Window and bottle glass	23	6,300	4,000,000
Men's felt and wool hats .....	51	5,500	2,000,000
Jewelry .....	65	2,700	3,000,000
Pottery .....	30	3,700	5,500,000
Leather .....	55	3,900	6,300,000
Shoes .....	48	4,900	2,300,000
Woolen and worsted goods .....	38	7,600	8,000,000
Chemical products.....	42	3,400	13,800,000
Refined oils and by-products .....	14	2,800	17,300,000
Silk .....	152	27,700	22,500,000

ing machines and shipbuilding, New Brunswick for hosiery, Perth Amboy and its vicinity for bricks and terra-cotta, Bridgeton, Millville, Vineland and smaller towns for glass. There are approximately 200,000 wage-earners in New Jersey, and the annual product of their labor is

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about \$400,000,000. From reports obtained for 1900, the data as shown in the foregoing table is presented in round figures as to the 11 great industries of New Jersey.

Of the other industries, outside those of an agricultural and manufacturing character, the oyster and fish industry is most conspicuous. From the mouth of the Raritan River to Sandy Hook, from Barnegat Bay to Cape May and thence in Delaware Bay to Salem, are about 15,000 acres of productive oyster beds. From the famous Maurice River oyster beds alone \$2,275,000 worth of these bivalves were shipped, exceeding in value the wheat crop of the State. From the Atlantic Ocean and Delaware Bay, vast quantities of clams, and fish of many kinds are sent to nearby markets. Shad and sturgeon, the latter furnishing caviare, are caught in Delaware Bay and river.

*Transportation.*—There are in New Jersey about 2,300 miles of railroad, with about 35,000 employees, whose duties are performed within the limits of the State. The railroad companies having trackage in the State are the Pennsylvania and the West Jersey and Sea Shore, representing about one third of the total miles of track. The remaining roads are the Central of New Jersey, Philadelphia and Reading, Erie, Delaware, Lackawanna and Western, New York, Susquehanna and Western, the Lehigh Valley and about 30 unclassified companies. Within the State are the two gateways, Jersey City and adjacent cities leading to greater New York and Camden to Philadelphia. All of the above companies have terminal facilities in Jersey City, Weehawken and Hoboken. Every railroad entering New York city from the west and south, except the New York Central, now lands its passengers in New Jersey. There are nearly 1,000 miles of cable, electric and horse railroad in the State, a large percentage of the trackage being under the control of the Public Service Corporation. A practically continuous trolley service has been established between Jersey City and Camden, uniting Philadelphia and Greater New York. These roads have cost nearly \$150,000,000. In conjunction with the counties, townships, and cities and assessments upon abutting property owners, New Jersey has aided in the construction of 1,000 miles of good roads, penetrating every section of the State and usable at all seasons of the year. The canal systems of the State embrace the Delaware and Raritan, extending from Bordentown to New Brunswick, and the Morris, extending from Jersey City to Phillipsburg and uniting with the canal system of the commonwealth of Pennsylvania. The total mileage is 173.34.

*State Institutions.*—New Jersey has lately largely increased her activities in the matter of support of State institutions. That of a penal character is the State Prison located at Trenton. Those of a correctional character are the Reformatory for men and boys located near Rahway, the State Home for Girls near Trenton, and the State Home for Boys near Jamesburg. Those for dependents, defectives and delinquents are the State Hospitals for the Insane near Trenton and near Morristown, the Home for Feeble-minded Women and the Home for Feeble-minded Children (separate institutions) each located at Vineland, the State Village for Epileptics near Skillman and the School for

the Deaf at Trenton, the latter being under the control of the State Board of Education. These institutions are under the administration of separate boards appointed by the governor of the State. New Jersey has not yet adopted the plan of a general board of supervision or control. In matters of education, the State sustains a Normal and Model School at Trenton, the Farnum Preparatory School at Beverly, Manual Training and Industrial School for Colored Youth at Bordentown, agricultural college and experiment station, and teachers' institutes and libraries. Other functions assumed by the State are the preservation of fish, game and oysters, the care of the lives of employees in factories and workshops, an extensive geological survey, the preservation of historic sites, of the Palisades of the Hudson River and of public documents, the removal of children from such improper influences as poor-houses, the prospective care of tuberculosis patients. For her soldiers and sailors and their wives New Jersey has established homes at Kearney and Vineland.

*Seaside Resorts.*—The diversified scenery and climate of the State has led to the establishment of many resorts in all parts of New Jersey. Along the sea coast, Cape May has been noted as such for about a century, to be soon followed by Long Branch. Atlantic City has had in 1904 an organized existence of 50 years and represents, in growth and attractiveness, the most conspicuous example of municipal sea-shore development to be found in the world. Asbury Park and Ocean Grove were established about 1870. Within the last quarter of a century, practically every foot of beach front from Sandy Hook to Cape May has been subjected to a greater or less degree of development. Of the mountain resorts, one hotel property at Schooley's Mountain has entertained visitors for a century. Such lakes as Budd's, Hopatcong, and Greenwood are noted, while many hotels are to be found in the hilly country within easy access of New York. There are in the hills and mountains of the State, however, no communities devoted exclusively to furnishing amusement and health to visitors. In the "Pines" are a number of small resorts, all being overshadowed by Lakewood, the nearest point in the Pines accessible to Greater New York.

*Education.*—As early as 1662 a schoolmaster was settled among the Dutch land owners in what is now Jersey City; about 10 years later schools were erected in Newark, Woodbridge, Amboy, Elizabethtown, Freehold and Piscataway, while in 1683 the Society of Friends at Burlington set aside rents from an island in the Delaware, for the purposes of public education. In 1817, after nearly 20 years' agitation, the legislature created the first school fund. The management of the schools of the State is vested in a State Board of Education appointed by the governor. This board appoints superintendents for each of the 21 counties of the State. Although the Constitution requires that the State shall provide free instruction for all children between the ages of 5 and 18, the State has extended the age from 4 to 20. Courses in kindergarten and manual training have been extensively adopted, particularly in the large industrial centres.

The number of school-houses in the State is about 1,900, providing accommodations for

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1. Looking toward the Delaware Water Gap from Manunka Chunk.
2. Falls of the Passaic, Paterson.



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400,000 pupils. The value of the school property is \$28,582,358.

The report of the Superintendent of Education for 1908 showed an enrollment of 402,866, and an average daily attendance of 289,167. There were 10,279 teachers, of whom 9,173 were women employed at an average annual salary of \$697,006. The total receipts for public schools during 1908 were \$17,693,858 (including a balance of \$1,909,957 from 1907), and the expenditures \$14,951,775.

Of the many private schools in the State among the most conspicuous are Lawrenceville School (John C. Green Foundation), one of the most famous in the country, Princeton Preparatory School, Peddie Institute at Hightstown, Pennington Seminary, all in the county of Mercer. Other schools are St. Mary's Hall in Burlington, the West Jersey Academy and South Jersey Institute at Bridgeton, Newark Academy, Hasbrouck Institute at Jersey, Bordentown Military Academy, Blair Presbyterian Academy at Blairstown, Centenary Collegiate Institute at Hackettstown. There are theological institutions at New Brunswick, at Princeton, at Madison and at Newark. The three conspicuous colleges in the State are Princeton University, Rutgers College at New Brunswick and Stevens Institute of Technology at Hoboken. Princeton University ranks among the greatest universities in America. It has made the town of Princeton as famous as Cambridge, Mass.

**Churches.**—Throughout the colonial period of New Jersey three lines of religious activity were noticeable. In the eastern portion, the various phases of Calvinism were transplanted over-sea by the settlers. The Hollanders, the Scotch and many of the English emigrants, and the French Huguenots found a common bond of association in Calvinism. Ultimately Presbyterianism, outside of the sphere of Dutch influence, became dominant. In the western portion of the colony the Society of Friends held sway, with strength in Monmouth County, a part of the eastern portion. The Church of England never obtained a strong hold in the colony, its main congregations being at Burlington, Trenton, Perth Amboy, Elizabeth and Newark. During the middle part of the 18th century, Whitefield and Tennant, as Calvinists, and John Woolman, the apostle of the abolition movement in America, paved the way for future changes. Following the Revolution, the Methodist Episcopal Church, with its democratic teachings, recruited largely from the Society of Friends and from many of the Presbyterian congregations. With the coming of the Irish and German emigrants into New Jersey, in the period of extension of transportation systems (1830-60), the Roman Catholic Church made great advance.

**Banks and Banking.**—The State Legislature granted charters to two banks, one in Newark and one in Trenton in 1804. In 1812 a general banking law was passed for the protection of depositors, the law remaining in force until 1850, when other laws were passed. There were eight banks of issue in 1860. In 1868 there were 55 national banks in the State, 115 in 1900, and 124 in 1901. In the last named year there were 18 State banks. The Legislature established a department of banks and insurance in 1891, and

the banking law was again revised in 1899. Since 1880 New Jersey has been a favorite State for trust companies and for the organization of large corporations. Savings banks were first established in 1828. In 1876 a law was passed regulating these institutions. In 1910 the condition of the New Jersey banks was thus summarized:

	No.	Capital	Surplus
National banks.....	191	\$21,462,000	\$20,434,375
State banks.....	18	1,498,750	1,087,500
Mutual savings banks..	25	.....	7,047,940
Trust companies.....	83	16,225,000	18,822,881

**Finances.**—The finances of the State are in most excellent condition, there being no bond issues for which interest and a sinking fund must be provided, nor is there a State tax levied. The total receipts of the State at the close of the fiscal year ending 31 Oct. 1909 amounted to \$8,637,221, and the total disbursements were \$7,774,615, leaving a balance 31 Oct. 1909 of \$3,680,082. The financial receipts of the State are largely derived from the tax on railroads and miscellaneous corporations which pay a large share of the total revenue. These figures show a steady increase in wealth and material prosperity. The cost of the State government has greatly increased in recent years, and in 1909 was approximately \$4,300,000 due to the growth of the State and extension of its activities. Other important sources of revenue are State fees from the offices of the clerks in chancery and supreme courts, the collateral inheritance tax, from the office of commissioner of banking and insurance, from the office of Secretary of State, from the State Prison and State Reformatory and from the oyster commission.

**Population.**—New Jersey began to obtain rapid growth in population about the year 1840; the absolute increase being the greatest in the decade from 1890 to 1900, due largely to the immigration of foreigners and the suburban New York population. The growth of population is given by the government census as follows: (1790) 184,139; (1820); 277,426; (1850) 489,555; (1860) 672,035; (1870) 906,096; (1880) 1,131,116; (1890) 1,444,933; (1900) 1,883,669. In 1900 there were 431,884 residents of foreign birth, one half of which number were German and Irish. In 1910 the population had increased to 2,537,167. There are 337 people to the square mile, and about 67 per cent of the population reside in 49 cities of over 4,000 population each.

The largest cities in the State with their population for 1910 and 1900 are as follows:

	1910	1900
Newark.....	347,469	246,070
Jersey City.....	267,779	206,433
Paterson.....	125,000	105,171
Trenton.....	96,815	73,307
Camden.....	94,538	75,935
Elizabeth.....	43,409	52,130
Hoboken.....	79,324	59,364
Bayonne.....	55,545	32,722
Passaic.....	54,773	27,727
Atlantic City.....	46,150	27,838
West Hoboken.....	35,403	23,004
East Orange.....	34,371	21,506

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Following is a list of the counties in New Jersey with their population for 1900 and 1910:

COUNTY	Square Miles	1900	1910
Atlantic.....	567	46,402	71,894
Bergen.....	236	78,441	138,002
Burlington.....	869	58,241	66,565
Camden.....	222	107,643	142,020
Cape May.....	256	13,201	19,745
Cumberland.....	511	51,193	55,153
Essex.....	127	359,053	512,886
Gloucester.....	326	31,905	37,368
Hudson.....	43	386,048	537,231
Hunterdon.....	437	34,507	33,506
Mercer.....	226	95,365	125,657
Middlesex.....	312	79,762	114,426
Monmouth.....	479	82,057	94,734
Morris.....	475	65,156	74,704
Ocean.....	583	19,747	21,318
Passaic.....	198	155,202	215,902
Salem.....	359	25,510	26,099
Somerset.....	305	32,048	38,820
Sussex.....	529	24,134	26,781
Union.....	103	90,353	140,107
Warren.....	362	37,781	43,187
Total.....	7,545	1,883,669	2,537,167

**Government.**—The general government of the State is administered under a Constitution adopted by the people in 1844, and in 1875 amended by a special election. Amendments to become a law, or a part of the Constitution, must receive the approval of the majority of the members of two consecutively chosen legislatures of the State, and must then be submitted to the people. A majority vote of the electors of the State is necessary for adoption. Five years is the time that must elapse between the submission of amendments to the people. Duly qualified voters are male citizens who have resided in the State one year, and in the county five months. The law requires the registration of voters. State elections are held annually on the Tuesday after the first Monday in November. The State has 10 representatives in the Lower House of Congress.

**Legislature.**—There are 21 State senators composing the Upper House of the Legislature, one from each county, and the term of office is three years. There are 60 members of the House of Representatives, elected from the counties on the basis of population. The term of office of a member of the Lower House is one year. Revenue bills originate in the Lower House.

**Executive.**—The governor is chosen by popular vote and for a term of three years. He cannot be re-elected without an intervening three years. He has power to call extra sessions of the Legislature, or of the Senate without the Representatives. He has the usual veto power which may be overruled by a majority vote of all the members of the Legislature. He grants pardons and reprieves in conjunction with the chancellor and six judges of errors and appeals. The state treasurer and comptroller are appointed for three years at a joint session of the Legislature. The governor, subject to the approval of the Senate, appoints for terms of five years the secretary of state, attorney-general, clerk of supreme court, clerk of the court of chancery, and keeper of the State prison.

**Judiciary.**—New Jersey has courts of law and courts of equity. The chancellor of the State and the judges of the supreme court are appointed by the governor, subject to approval

by the Senate, for terms of seven years. The courts are supreme court, county courts, orphans' court, and court of general quarter sessions of peace. The chancellor, the justices of the supreme court, and six judges specially appointed, constitute the court of errors and appeals. The Senate tries cases of impeachment.

**Local Government.**—The counties and towns are governed under general laws, and special laws cannot be passed unless by amendment of the Constitution. The justices of the peace are elected for five years by vote of the electors of the townships. The counties elect surrogates and clerks for terms of five years. The counties elect, also, sheriffs and coroners for three years, but such officers cannot be re-elected without an intervening three years. The cities and townships are required to have local boards of health.

**History.**—Based upon the conclusions reached by a group of scientists of international reputation, it may be stated that Man, known as "Glacial," "Argellite," and "Palaeolithic," resided within the limits of New Jersey, at the close of the Age of Ice. The proofs offered are the presence of non-intrusive stone implements, remains of extinct quadrupeds, used by primitive man as food, and human skulls and bones, all of which have been found in and near the city of Trenton. At this point, a large deposit of river wash, particularly sand and gravel, indicates that at one time the mouth of the Delaware River was directly south of Trenton. In the river wash the above mentioned evidences of human occupancy have been found. The culture point attained by these earliest inhabitants was probably that reached by Man in the Stone Age in Europe.

The Indians whom the Dutch and Swedes found in New Jersey were known as the Lenni-Lenape, members of the great Algonquin family. They were comparatively few in number, scattered in shifting communities along the river valleys and the sea coast. Less warlike than the Indians of New England or of Virginia, the Lenni-Lenape, later known as the Delawares, made some progress in agriculture and in the elementary arts. With the Dutch and Swedes, the Indians maintained comparatively peaceful relations, although a traders and settlers' war in the Raritan Valley, before the coming of the English, is a matter of record. After the English conquest of 1664, the Indian, although kindly treated by the Society of Friends in West Jersey, and tolerated by the Calvinists in East Jersey, could not withstand the effects of European civilization. Consumption, smallpox, venereal diseases, and alcoholism drove him down to the depths. Distrustful of the efforts made by the missionaries, his personal liberty restrained by legislation and social custom, the Indian was enslaved, and by intermarriage with the negro, lost his identity. In 1758, most of the New Jersey Indians were removed to the first reservation ever established within the limits of the present United States—that located at Edgepelick, Brotherton, or Indian Mills in the "Pines" of Burlington County. At the opening of the 19th century the Indians were removed to New York, and thence after various wanderings to Indian Territory. Lenni-Lenape of the full blood are now extinct in New Jersey.

Holland, politically and religiously free, and



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struggling with Sweden for supremacy as a world power, located upon Manhattan Island, her principal fort and trading post in the New World. Her navigators explored the coasts of New Jersey, and to one of the great rivers, the North, was given the name of Hudson. Cornelius Jacobsen Mëy sailed up the Delaware, then known as the South River, and commemorated himself by the name Cape May. By discovery and occupancy Holland laid claim to the soil of New Jersey. From New Amsterdam, farmers and traders established themselves in what is now Hudson and Bergen counties. By 1650 colonists had penetrated the river valleys emptying into all the waters of the Greater New York Harbor. Settlements were attempted on the Delaware. The efforts of the Dutch, in the colonization of New Jersey, were only successful in the northeastern portion of the State, where the church, speech, and lines of political thought of the fatherland firmly impressed themselves upon the community until recent years.

Gustavus Adolphus, in his scheme of Swedish colonization for North America, utterly disregarded the presence of the Dutch in New Jersey. For about 15 years after 1640, several groups of Swedish settlers occupied the valley of the Delaware, locating principally in the vicinity of Philadelphia. The communities of Swedes in New Jersey, isolated, and neglected by the home government and harassed by the Dutch, finally submitted, with their associates in Pennsylvania and Delaware, to the domination of Holland. From 1655 to 1664, New Jersey remained under the absolute control of Holland.

Recognizing the fact that Dutch control of the valleys of the Hudson and the Delaware separated New England from the southern colonies, Charles II., king of England, granted to his brother, James, Duke of York, a vast domain in North America, including much of what is now New England, New York, and New Jersey. An English naval expedition, in the summer of 1664, sent to New Amsterdam, secured the capitulation of the Dutch. To John, Lord Berkeley and Sir George Carteret, two faithful adherents of the House of Stuart during the Protectorate, the Duke of York made a transfer of what is practically the territory of New Jersey.

In recognition of Carteret's defense of the island of Jersey, against the Cromwellian forces, the Berkeley-Carteret grant was called *New Jersey*. The policy of the proprietors was to attract settlement, which was accomplished by exploiting the natural advantages of the colony, granting a liberal frame of government and providing for allotments of free or low-priced land. There was a very pronounced New England movement into the valleys of the Passaic and smaller streams, and by the introduction of social, political and religious views of the Congregationalists, the eastern portion of the colony became a partial reproduction of New England itself. Within a few years Berkeley disposed of his interests to a company largely composed of members of the Society of Friends. A partition being desirable, a line was run from Little Egg Harbor to a point near the Delaware Water Gap. Henceforth, after 1676, begins the political history of East and West Jersey. To Carteret fell East Jersey; while West Jersey

became the property of the members of the Society of Friends. After 1676, the western portion of the State was open to English settlement, the dominant spirit being William Penn. The communities established in the Delaware river valley were isolated, and a plantation life, not unlike that of Virginia and Maryland, lacking certain religious characteristics, was developed. The county in West Jersey became the political unit, as the town became the political unit in East Jersey. Both the Jerseys passed later under the domination of Boards of Proprietors, who exercised broad governmental powers, and, until the present, held title to unoccupied lands. From 1664 to 1702, when both boards relinquished governmental rights to the Crown, there was a constant spirit of popular unrest, and one complete and one attempted change in government. In 1673 New Jersey was recaptured and occupied for a few months by the Dutch. When James, Duke of York, became King James II., he endeavored, by means of Sir Edmund Andros, to upset the proprietary governments, the matter not being finally settled, favorably to the proprietors, until 1681. In the meantime, internal disturbances growing out of quit-rent agitations, affected the peace of the two proprietaries. The period from 1702 to the outbreak of the American Revolution was undisturbed by any dramatic incidents. The growth of Philadelphia and New York, as commercial centres, tended to develop the agricultural interests of New Jersey. As early as 1710 the tendency to draw the active forces of the colony into the two cities was apparent, leading to Benjamin Franklin's famous aphorism, uttered soon thereafter, that New Jersey was like a cider barrel, tapped at both ends. The usual colonial quarrels between the Crown officers and the popular branch of the legislature were reflected in New Jersey, as elsewhere. Landed interests dominated the governor's council, small property owners were disfranchised, business enterprises were restricted, if not prohibited, by legislation in Parliament, and by taxation, commerce on the high seas was suppressed by the Navigation acts, metallic currency was withdrawn from the colony,—a score of causes, mainly economic, operated to produce the resort to arms.

While loyal to the Crown, there were, nevertheless, mutterings of discontent, of ill-concealed defiance of law officers and a spirit of restlessness, restrained by the wave of patriotism evoked by the French and Indian war, but which swept on with increasing force after the opening of the year 1770. The most notable events of this period, from 1702 to 1775, were the suppression of piracy in the vicinity of New York and Cape May; the establishment of a continuous land and water route from Philadelphia and New York; the erection of ferries and post roads; the appearance, in the northern, central and western parts of the colony, of Huguenot, Scotch-Irish and Palatinate emigrants; the chartering of Princeton University and Rutgers College; the establishment of the first Indian reservation in the United States in Burlington County, the religious revival of George Whitefield, and the promulgation of John Woolman's abolition doctrine; the massacres by the Indians in Sussex County, and the erection of a series of barracks, owing to their need in the French and Indian war, in various parts of the State. The open-



ing of the American Revolution found New Jersey divided in sentiment. The Calvinistic element, represented so largely in East Jersey, took the initiative. The spirit of war, as in New England, appeared in the town meeting. The professional classes, the members of the Society of Friends, and the large merchants were either opposed to war or were non-combatants. A minority awaited the results of agitation. The strength of the element loyal to the home government may be shown from the fact that upon 2 July 1776, when New Jersey asserted her statehood, the Constitution contained a proviso that the document should not be operative in case of a reconciliation between England and New Jersey. William Franklin, the last colonial governor of New Jersey, remained loyal to the Crown, and, banished from New Jersey, sought refuge among Tory sympathizers in New York city, becoming the adviser of those planning movements of Tory invaders in the State. Largely conducted in the northern central portion of New Jersey, under the control of Crown sympathizers, these raiders gained the name of "Pine Robbers." During the Revolution, nearly 100 battles and skirmishes were fought upon the soil of the State. Most conspicuous were the battles of Trenton (26 Dec. 1776), Princeton (3 Jan. 1777), Red Bank (22 Oct. 1777), Monmouth (28 June 1778), and Paulus Hook (19 Aug. 1779). Among minor engagements of importance were the fights at Bound Brook (13 April 1777), Egg Harbor (15 Oct. 1778), Hancock's Bridge (21 March 1778), Tom's River (24 March 1782), the burning of Bordentown (8 May 1778), and no less than a score of engagements in and around Elizabeth and Newark and nearby territory. During the war occurred the "retreat across the Jerseys" and Washington's two winter occupations of Morristown. At the close of the war, New Jersey was sadly impoverished. Her spirit was distinctively Federal. She participated in the Annapolis Convention, her representatives advocated the "New Jersey plan" at Philadelphia, in the framing of the Federal Constitution, which she adopted without a dissenting voice. With the opening of the 19th century, New Jersey became a political storm-centre. As a Federalist leader, Alexander Hamilton had wielded a powerful influence in the State. He had been active in the establishment of the Society for the Improvement of Useful Manufactures, out of which grew the city of Paterson, and had urged the development of Paulus Hook (the site of Jersey City). He was closely allied with the Federal elements until then in control of New Jersey politics. Arrayed against him was Aaron Burr, son of the Rev. Aaron Burr, sometime President of the College of New Jersey, now Princeton University. The end of the antagonism between Burr and Hamilton came in a duel fought in 1804, at Weehawken, New Jersey. The activities in politics were reflected in industrial life. Before the second war with England, a chain of State banks was established, bridges crossed the rivers between Philadelphia and New York, steamboats were to be found upon the Delaware and Hudson rivers, highways were extended to every accessible part of the State, and the development of water-power led to the establishment of many small factories. The second war with England blighted the prospects

of growth. Although no engagements occurred upon her soil, New Jersey, as much for the protection of Philadelphia and New York, as for her own interest, furnished militia to garrison forts on the Delaware and at Sandy Hook. The position of the State led to overland transportation of military supplies between the North and South, for the reason that the Atlantic seaboard was blockaded by British fleets. From this condition and owing to the demand for good roads, the first railroad charter ever granted in the United States passed the Legislature in the year 1815. This, in connection with the revival of agitation concerning internal waterways, led to the constructing of the Camden and Amboy railroad and the Delaware and Raritan canal, now a part of the standard lines of the Pennsylvania Railroad system across the State of New Jersey.

The development of the industrial era, following the close of the War of 1812, broken by the panics of 1817, 1837, and 1857, marked the growth of Newark, Jersey City, Paterson, Elizabeth, New Brunswick, Trenton, and Camden. The period of social unrest characteristic of Jacksonian dominance in politics led to the adoption of a new State constitution in 1844, pronounced reforms of a penalological and charitable character, the extension of the public school system and the growth of railroads. The Civil War found New Jersey ready to respond to the call for troops. To the cause of the Union she furnished 88,305 men, or within 10,501 of her entire militia, and for the organization, subsisting, supplying, supporting and transporting her troops she paid nearly \$3,000,000. Following the war came a period of prosperity. The agricultural advantages of the southern portion of the State, first practically promoted at Vineland and latterly fully disclosed by the success of the Jewish settlement at Woodbine, revolutionized a large area south of Camden. The overplus of population of Philadelphia and New York sought permanent and temporary homes in New Jersey, while the industrial centres of the northern and eastern portions of the State grew with unprecedented rapidity. The present prosperity of the State is largely due to the changes which have occurred in the last three decades.

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## NEW JERSEY—NEW JERUSALEM CHURCH

**New Jersey, College of.** See PRINCETON UNIVERSITY.

**New Jersey Foreigners,** in American humor, an allusion to New Jersey as a foreign country, and to New Jerseymen as foreigners; a saying handed down from the time when Joseph Bonaparte, ex-king of Spain and Naples, after the downfall of Napoleon, sought an asylum in the United States. As an alien he was obliged to obtain a special act of Legislature to enable him to hold real estate. Pennsylvania refused, but New Jersey consented, and he established himself in princely magnificence at Bordentown. Hence men of other States used to declare that the Jerseymen, with their foreign prince, were foreigners.

**New Jersey Plan,** in American history, a plan for a Federal Constitution proposed at the Convention of 1787 by William Paterson, of New Jersey. The resolution provided for the enlargement and correction of the Articles of Confederation; that Congress should remain a single body, and should regulate taxation and commerce, and should choose the executive; that requisitions from States should be continued; that a judiciary should be established; that naturalization should be uniform; that the executive should coerce refractory States or individuals, and other provisions of less importance. This plan was unfavorably reported from the committee to whom it was referred.

**New Jersey Tea.** See CEANOTHUS.

**New Jerusalem,** je-roo'sa-lēm, the name given by the Apostle John in the Book of Revelation to heaven.

**New Jerusalem Church, The.** The Church called the New Jerusalem derives its name from the Apocalypse or Revelation of John, chapter xxi. 1 et seq. The doctrines of this Church are set forth in the theological writings of Emanuel Swedenborg (q.v.), who is recognized by the members of the Church as a divinely illumined seer and revelator. The New Jerusalem, or The New Church, as it is denominated throughout Swedenborg's writings, is a spiritual city, not a natural and material city. A spiritual city is the home and abiding place of man's heart and mind, of his love and his faith, therefore such a spiritual city or home is properly called a Church. The New Church now being established among men on the earth is what is meant by the descent of the Holy City, the New Jerusalem. But a Church is a Church from its love and its faith, not from the membership of its organization, hence the New Church must be viewed in the light of its doctrines which present the nature and quality of its love in the form of its faith.

The faith of the New Church is as follows: The Lord Jesus Christ is God himself, the one only God of the universe,—the creator, the redeemer, the regenerator, and the saviour. God in the Old Testament is called most commonly Jehovah (The Lord in A. V.), a Hebrew word signifying *The Being*, "I am Who I am," the self-existent and eternal, from whom all things are, thus who is all in all things of his creation. God in the New Testament is called Lord, Jesus Christ, Father, Son, and Holy Spirit, besides other names. Since the Word is God's revelation and expression of himself, the differ-

ent names by which he is denominated therein distinguish his essence and existence, his love and wisdom and power. They define and qualify his nature and disposition, his ends, his methods and his acts. By the Father, therefore; is not meant a divine being or person separate and apart from other divine persons called the Son and the Holy Spirit, but the Father signifies the divine inmost, the divine esse, the divine love; the Son signifies the divine existence, the divine appearing, divine revelation, divine truth, the divine word, the Divine Human. The Holy Spirit signifies the divine proceeding, the divine operation, the divine influx, adapting and appropriating to man the divine life of love and truth. Thus the Trinity as understood in the New Church is not involved with an idea of three Gods, but it is distinctly taught in the doctrines of this Church that there is a Trine in God, our Lord Jesus Christ, of love, wisdom, and power. To this Trine he referred when he "spoke in parables" of the Father, Son, and Holy Spirit. It is believed that now is the consummation of the age or the last time of the Church—the end of the world, as translated in the Authorized Version.

The consummation of the age or the last time of the Christian Church is predicted in the Evangelists and in Daniel. (See Matt. xxiv. 15, 18, 21, 22, 28; xxviii. 20; Luke xvii. 34; John ix. 4; i. 4 et seq.; viii. 12; xii. 35, 36, 40; Daniel ix. 27.)

This consummation does not mean a literal and visible destruction of the natural world at the "Last Day," but the end of the former ecclesiasticism as a Church in the true sense of the word; that is to say, where genuine charity or love prevails in conjunction with a living faith. That the Christian world to-day is not permeated nor dominated by the principles of human life as taught by Jesus Christ and evangelized by his apostles is one of the evidences and confirmations of the teachings of the New Church, that now is "the end of the world," the consummation of the age, the Lord's second coming and the establishment of a new church by him. The last judgment also has been accomplished, primarily and completely, throughout the spiritual world whither all souls depart at death, but in the natural world the effects of the judgment appear gradually, by little and little, in the changes which have come to pass. Among the most conspicuous of such results is the greater freedom of thought and speech in respect to both spiritual and natural things, and hence a more universal breadth of view and tolerance of opinion.

But these signs of the times are only certain effects, visible to common observation, of the second coming of the Lord and his establishment then of the New Jerusalem.

Swedenborg declares ('The True Christian Religion,' No. 772) that this second coming of the Lord is to separate the evil from the good, so that those may be saved who have believed and do believe in him; and to form from them a new angelic heaven and a new Church on earth, otherwise no flesh could be saved (Matt. xxiv. 22).

This work of separation was accomplished in the spiritual world in 1757 upon all who had died since the Lord's first coming in the flesh. The separation of the evil from the good, their

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judgment to hell and the elevation, at the same time, of the good to heaven is what is meant by the Last Judgment, and Swedenborg, having witnessed it, describes the event in a work called 'The Last Judgment.'

Since the Lord, when upon earth, glorified his human nature by making it divine and uniting it to the divine from which it was begotten, therefore this second coming must be an appearing and revelation of the Lord God in his divine-human nature, or, as it is called throughout Swedenborg's writings, the Divine Human.

This Divine Human, invisible to man's natural sight in this world, is manifest clearly in the spiritual world to man's spiritual vision, which everyone enjoys immediately after death. But in order that the second coming might be announced and made known throughout the world as well as among angels and spirits, it was necessary that some man should be chosen and prepared to live consciously in both worlds at the same time in order to see and hear the things transacting in the spiritual world and then to narrate and describe them in natural language for man upon earth.

As such a seer and revelator Emanuel Swedenborg solemnly asseverates he was especially prepared and appointed to be. In 'The True Christian Religion,' No. 771, he says: "Lest the man of the New Church, like the man of the Old Church, should wander in the shade, in which the sense of the letter of the Word is, especially concerning heaven and hell, and concerning his life after death, and concerning the coming of the Lord, it has pleased the Lord to open the sight of my spirit, and thus to let me into the spiritual world; and not only to give me to speak with spirits and angels and with relations and friends, but with kings and princes, who have departed from the natural world; and also to see the stupendous things of heaven, and the miserable things of hell; and thus that man does not live after death in some unknown place of the earth, nor fly about blind and dumb in the air, or in empty space; but that he lives as man in a substantial body, in a much more perfect state, if he comes among the blessed, than before, when he lived in the material body. Therefore, lest man should become more deeply grounded in the opinion respecting the destruction of the visible heaven and the habitable earth, and thus respecting the spiritual world, from ignorance, which is the source of naturalism, and then, at the same time, atheism, which, at this day, among the learned has begun to take root in the interior rational mind, should, like a mortification in the flesh, spread itself around more widely, even into his external mind, from which he speaks, it has been enjoined upon me by the Lord to promulgate some of the things seen and heard, both respecting heaven and hell, and respecting the last judgment; and also to explain the apocalypse, where the coming of the Lord, and the former heaven, and the new heaven, and the holy Jerusalem, are treated of; from which, when read and understood, any one may see what is meant there by the coming of the Lord, and by the New Heaven, and by the New Jerusalem."

"This second coming of the Lord is effected by means of a man, before whom he has manifested himself, and whom he has filled with his

spirit, to teach the doctrines of the New Church through the word from him."

"Since the Lord cannot manifest himself in person, and yet has foretold that he would come and establish a new Church, which is the New Jerusalem, it follows that he is to do it by means of a man, who is able not only to receive the doctrines of this Church with his understanding, but also to publish them by the press. That the Lord has manifested himself before me, his servant, and sent me on this office, and that, after this, he opened the sight of my spirit, and thus let me into the spiritual world, and gave me to see the heavens and the hells, and also to speak with angels and spirits, and this now for many years, I testify in truth; and also that, from the first day of that call, I have not received anything that pertains to the doctrines of that Church from any angel, but from the Lord alone while I was reading the Word." (T. C. R. 779.)

Such plain statements as these, and there are very many more like them throughout his writings, to the New Churchman, define Swedenborg's office and place in the world among men and give to all his theological books the stamp and seal of divine authority.

In 'Heaven and Hell' (No. 1) Swedenborg declares that his writings are an immediate revelation from God the Lord Jesus Christ, and constitute his second coming. It is, therefore, believed in the New Church that the doctrines revealed through Swedenborg are the divine Word itself, although in quite a different form from the "Sacred Scriptures," but the Word is not God's communication of himself to man by virtue of its form, but because of the divine truth which reveals itself in such a manner, the truth really making its own form of manifesting itself.

Throughout his writings Swedenborg shows that the divine word has an internal sense within the literal sense, this internal sense being the very Word itself, its essence, its glory, and its life. This sense, indeed, Swedenborg declared to be disclosed solely by means of his writings. Within the New Church it is believed, therefore, that the writings of Swedenborg are the Lord in his second coming in his divine humanity, and thus the very Word itself in its spiritual sense set forth in a rational and philosophic form.

In America there are two general organizations of those who receive the testimony of Swedenborg and acknowledge his writings to be divine revelation. One, "The General Convention of The New Jerusalem," dating from 1877; the other, "The General Church of the New Jerusalem," holding its first "General Assembly" in June 1897. The representative organ of the former is 'The New Church Messenger.' "The General Church" is represented by 'The New Church Life.'

The "Convention's" theological school is located at Cambridge, Mass. At Bryn Athyn, Penn., is a settlement of New Church families devoted especially to the work of education in accordance with the principles of instruction and the formation of character as set forth in the new revelation. "The Academy of the New Church," now well established there, is a corporation instituted for the purpose of conducting a universal system

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of schools wherein shall be taught the doctrine and religion of the Church, as well as every useful science and art. The end and aim of the Academy is to educate its pupils, not only for a life of efficiency in the natural world, but pre-eminently to prepare them to become most useful inhabitants and citizens of the spiritual world in the life after death. The influence of this organization, dating its beginning from 1876, has been incalculable and far-reaching, extending throughout the borders of the Church. By its profound study and learning in the doctrines of the Church it has set up a standard of interpretation of the writings of Swedenborg, and by its attitude of loyalty and faithfulness has exalted them within the Church into a position of supreme authority and power.

Besides these bodies of the Church in America and Canada, and the General Conference in Great Britain, there are societies in Europe and Australia, most of them being united to or affiliated with one or other of the general churches in the United States or Great Britain. The Swedenborg Scientific Association was organized 27 May 1898 by members of the New Church. For a more extended notice of this body see SWEDENBERG.

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**New Ken'sington**, Pa., borough, in Westmoreland County; on the Allegheny River, and on a division of the Pennsylvania railroad; about 15 miles northeast of Pittsburg. It is in a region noted for the manufacture of iron and steel. Its chief manufactures are steel and iron products, flour, lumber, brick, beer, and furniture. The glass and white lead works in the vicinity contribute to the industrial prosperity of the borough. Pop. (1910) 7,707.

**New Leinster**, lén'ster, or lín'ster. See STEWART ISLAND.

**New Lexington**, lēk'sing-ton, Ohio, village, county-seat of Perry County; on the Cincinnati & M. V., and the Toledo & O. C. R. R.'s; about 50 miles east by south of Columbus. It is in an agricultural section, and in the vicinity are coal fields and deposits of fire clay. The manufactures are chiefly brick and other clay products. There is considerable trade in farm products, brick, clay, and coal. It is the seat of Saint Aloysius Academy. Pop. (1890) 1,470; (1900) 1,701; (1910) 2,559.

**New Light**, a fish. See CRAPPIE.

**New Light and Old Light**, the names generally used to designate the two parties in the Presbyterian Church whose difference of opinion in regard to the power of the civil magistrate in matters of religion caused the disruption of the

Associate Synods of Scotland in the latter part of the 18th and the beginning of the 19th centuries. The terms were again used for the two parties in the similar controversy in the Reformed Presbyterian Church in the United States, which caused the division of that body in 1833. See PRESBYTERIAN CHURCH.

**New Lisbon**, or Lisbon, Ohio. See LISBON.

**New Lon'don**, Conn., city, port of entry, one of the county-seats of New London County; on the Thames River, and on the Central V., and the New York, N. H. & H. R.R.'s; about three miles from Long Island Sound and 50 miles in direct line southeast of Hartford. It has regular steamer connection with New York and all the Sound ports. Its fine harbor is protected by Forts Griswold and Trumbull.

In 1646 John Winthrop, the younger, founded Naumeg, and in 1658 the name was changed to New London. Prior to the Revolution it was of considerable commercial importance and had established trade with the coast towns of the nearby colonies and with the West Indies. During the war it suffered from attacks by the British. On 6 Sept. 1781 a British force under command of Benedict Arnold attacked the town, destroyed the wharves and many of the buildings, and killed a number of the people. In memory of this attack, a shaft 127 feet high has been erected at the place (see GROTON) where the massacre occurred. The town was incorporated in 1784. The first session of the Catholic Summer School of America (q.v.) was held in New London.

New London has a number of large manufacturing establishments, chief of which are machine shops, foundries, printing-press works, silk-mills, cotton-gin factory, woolen mills, bed-quilt factory, furniture factory, and ship-yards. Sealing and whaling continue to be of importance, and a considerable amount of farm products are exported. It is a distributing centre for a large amount of the imports used in the southeastern part of the State. Some of the historic places of interest are the Old Town Mill, built in 1646, the school house where Nathan Hale was once a teacher, and the Hempstead House. A government naval station is on the river outside the city limits. It has public and parish schools, the New London County Historical Society and Library, and a public library. The government is administered under a charter of 1804 which provides for a mayor, who holds office three years, and a council. The school board is chosen by popular vote. Pop. (1900) 17,548; (1910) 19,659. Consult: 'Historic New London,' in 'New England Magazine,' Vol. V.; Caulkins, 'History of New London'; Starr, 'Centennial Sketch of New London.'

**New Mad'rid**, Mo., city, county-seat of New Madrid County; on the Mississippi River, and on the Saint Louis Southwestern railroad; about 130 miles in direct line south by east of Saint Louis and about 50 miles below Cairo, Ill. It has regular steamboat connection with all the river ports. It was settled by Americans in 1788, when the Spanish owned east of the Mississippi. During the Civil War it was used as a Confederate station until 14 March 1862, when it was abandoned and became a Federal possession. It is situated in a productive agricultural region in which the principal crops are cotton, grain, and fruit. It has extensive lum-

## NEW MARKET—NEW MEXICO

ber interests. The trade is chiefly in lumber, grain, fruit, live-stock, and cotton. Pop. (est.) 1,700.

**New Market, Battle of.** In co-operation with Gen. Grant's Wilderness campaign and the movements of Gen. Crook, who was marching from West Virginia on Staunton, Va., Gen. Sigel, commanding the Union forces in the Shenandoah Valley, on 9 May 1864, marched from Martinsburg up the Valley pike with Gen. Sullivan's division of infantry, Gen. Stahel's division of cavalry, and five batteries of artillery, in all about 6,500 men and 28 guns. He arrived at Woodstock on the 11th, his cavalry pushing on to Mount Jackson, where, on the 14th, it encountered some of Imboden's cavalry, forced it across the Shenandoah, and followed as far as New Market. Col. Moor with parts of Sullivan's division and cavalry, joined the advanced cavalry at New Market late in the evening, and a skirmish ensued, in which artillery was used. Twice during the night strong demonstrations were made on Moor, which he repulsed. Gen. Breckinridge, commanding the Confederate troops in the valley, hearing of Sigel's advance, had collected at Staunton a force of 5,000 men, including the cadets of the Virginia Military Institute, with eight guns, and at daylight of the 15th drew up two miles south of New Market to give battle. Moor had, beside 300 cavalry and two guns, two regiments of his own brigade and two of Col. Thoburn's. Stahel came up in the morning and took command, and as it neared noon Sigel arrived with the rest of his army, and made disposition for battle. Moor was left in his advanced position, with his own two regiments and a small body of cavalry to hold Breckinridge in check, until Sigel could complete his dispositions, which were well made. Thoburn's brigade constituted the main line, along which were the batteries. The cavalry was behind the centre and on the left flank. The line extended across the pike on rising ground, another slope in front being held by Moor, Breckinridge formed line with Echols' brigade on the right and Wharton's on the left, the Institute Cadets and the 62d Virginia between the two. Imboden's cavalry and a six-gun battery were on the extreme right. McLaughlin's artillery occupied a sharp ridge left of and parallel to the pike and opened furiously upon Sigel's guns, which as furiously responded. Breckinridge advanced, and Moor, being overlapped on both flanks, fell back in some disorder, and Breckinridge, without pausing, pressed on and attacked Thoburn, who, charging from his right, checked him, Sigel's guns using shell and canister with great effect. Meanwhile Imboden crossed Smith's Creek and, moving down its east bank, gained the top of a small hill opposite Sigel's left, placed his guns on it, and at short range opened a rapid fire upon Sigel's massed cavalry, which immediately fell back, and Sigel ordered his entire line to fall back half a mile. Imboden's guns were now turned on the flank of the infantry, Breckinridge pressed on in front, and the contest was desperate and at close quarters, Von Kleiser's battery being particularly destructive to the centre of Breckinridge's line held by the Cadets. An order to charge the battery was given, the Cadets and the 62d Virginia went forward in fine style, and with great loss captured the battery; the rest of the line advanced, and

Sigel retreated, followed a short distance by Breckinridge. At Rude's Hill, nearly three miles from the field, Sigel halted and formed line; Breckinridge soon came up; there was an exchange of artillery firing; and at 7 P.M. Sigel abandoned Rude's Hill, crossed the Shenandoah, burned the bridge, and continued his retreat down the valley to Cedar Creek, which was reached early in the morning of the 17th. The Union loss was 93 killed, 552 wounded, and 186 missing. The Confederate loss was 42 killed, 522 wounded, and 13 missing. Consult: 'Official Records,' Vol. XXXVII.; Pond, 'The Shenandoah Valley in 1864'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.; Wise, 'The Battle of New Market.'

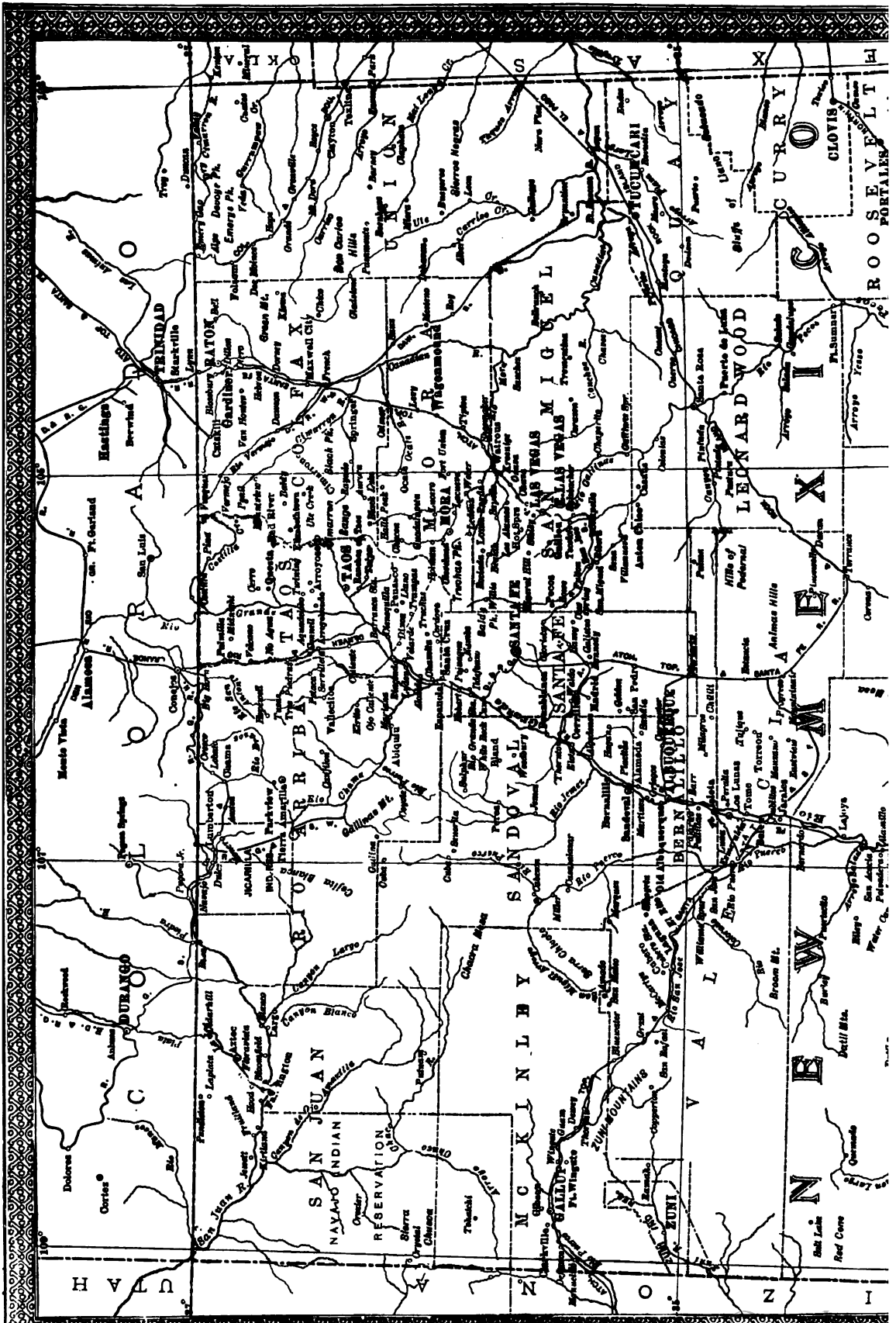
E. A. CARMAN.

**New Mecklenburg**, mēk'lēn-bērg, formerly NEW IRELAND, the second largest island of the Bismarck Archipelago (q.v.) to the northeast of New Pomerania, from which it is separated by Saint George Channel. It has an estimated area of nearly 5,000 square miles; with the exception of a small European trading station on the north coast it is inhabited by wild Papuan tribes.

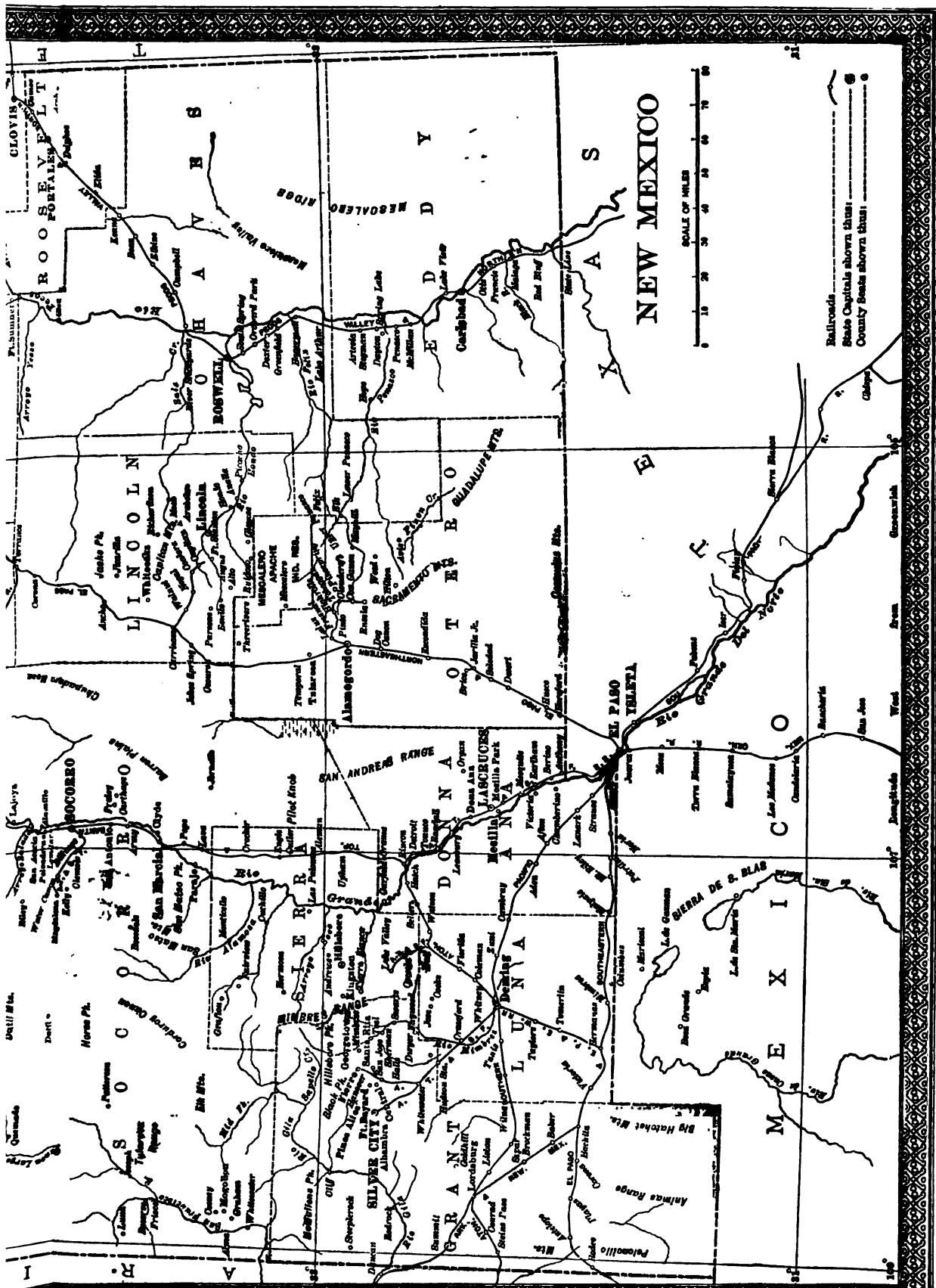
**New Mexico**, a State of the United States admitted Aug. 21, 1911, between lat. 31° 20' and 37° N., and lon. 103° and 109° 2' W.; bounded on the north by Colorado, on the east by Oklahoma and Texas, on the south by Texas and Mexico, and on the west by Arizona. Area, 122,460 square miles (78,374,400 acres), of which two thirds are public lands. Organized 25 Nov. 1850, under act of 9 Sept. 1850. Pop. (1890) 153,593; (1910) 327,301, or about 2.7 to the square mile. Capital, Santa Fé.

**Topography.**—New Mexico occupies a lofty plateau which reaches its greatest elevation in the north and west and slopes to the south and to the southeast, where lies the western part of the Llano Estacado, or staked plain, no part of the plateau being less than 3,000 feet above sea-level. The altitude of Santa Fé, in the north, is 6,998 feet, that of Albuquerque on the Rio Grande, near the middle of the Territory, 5,008 feet, while Carlsbad (formerly Eddy), on the Rio Pecos, is 3,122 feet. From the vast table-land, both east and west of the Rio Grande, rise numerous sierras and more or less isolated peaks belonging to the Rocky Mountain system. The Sangre de Cristo range of Colorado extends southward into New Mexico to lat. 35° 30', the various component ridges being the Culebra, Cimarron, Taos, Santa Fé, Mora, Las Vegas, Raton, etc. The principal peaks are Cerro Blanco (14,269), Truchas (13,150), Taos (13,145), Costilla (12,634), Baldy (12,623), Lake (12,380), and Mora (12,020). Southward from these and extending eastward are numerous isolated sierras—the Sandia, Manzano, Gallinas, Jicarilla, Caballo, Oscuro, San Andres, Organ, Blanca, Capitan, Sacramento, Hueco, Guadalupe, and many lesser mountains. West of the Rio Grande and within its immediate drainage is another broken sierra, extending southward from the Colorado line, its principal component groups being the Petaca, Valles, Gallinas, Nacimiento, Jemez, San Mateo, Magdalena, Socorro, Black, Mimbres, Florida, and Potrillo mountains. In the northwest the Carrizo, Tunicha, and Choiska mountains, forming











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part of the continental divide, extend into the Territory from Arizona, as do the San Francisco and Peloncillo ranges in the southwest; while lying between the western boundary and the mountains of the Rio Grande area are the Zuni, Datil, Little Diablo, Black, Tularosa, Mogollon, Pinos, Burro, Pyramid, Big Hatchet, Hacheta, and Animas ranges, with many others of lesser note.

**Rivers.**—The streams of northeastern, eastern, and central New Mexico flow into the Mississippi and the Gulf of Mexico, while those of the western portion empty into the Gulf of California. The largest river is the Rio Grande, which flows generally southwesterly from the Colorado boundary to lat. 33°, then southeasterly across the Mexican line. This river has several unimportant tributaries within the Territory—the Chama, Jemez, and Rio Puerco from the west and several of even less significance from the east. The Pecos has its source in the Las Vegas Mountains, flows southeasterly, then generally southward, almost paralleling the western escarpment of the staked plain, and southeasterly across the Texas border, finally joining the Rio Grande. The Canadian, with its several headstreams, drains northeastern New Mexico and passes out of the Territory in lat. 35° 25', forming a branch of the Arkansas. The western part is drained entirely by headwaters of the Colorado—the San Juan, the Zuni, and the Gila. The Rio Mimbres, which heads in the Florida Mountains, is, like all except the largest streams, non-perennial, and indeed even the channel of the lower Rio Grande is frequently dry.

**Forests.**—Several of the mountain ranges, particularly those of the north and in Lincoln and western Socorro, Grant, and McKinley counties, are covered with timber, the most valuable being pine, although oak, juniper, cedar, birch, maple, and other trees are common. The Pecos River, Lincoln, and Gila River forest areas have been reserved by the United States, but grazing of cattle is allowed under certain conditions. Piñon and cedar are abundant in the foot-hills throughout the Territory; mesquite is found in the southeastern part, east of the Pecos, while the saguaro or giant cactus forms a feature of the landscape in the southern and southwestern parts, where there are also groves of oak and walnut. Along all the water-courses cottonwoods are abundant, and occasionally willows and sycamores are found. Yucca, the roots of which are used as a substitute for soap, is everywhere abundant.

**Agriculture.**—In many of the valleys and mountain ranges (where the latter are not of exposed basalt) are nutritious grasses—at least 14 varieties, mostly gramma, being found—affording fairly abundant food for the large flocks and herds. Bear, deer, mountain lions, wildcats, and antelope elk are found in the mountains, and rabbits, hares, coyotes, and prairie-dogs are common in the plains. The valley lands are fertile, but as the Territory lies within the arid region, agriculture is conducted largely through irrigation, the irrigated farms forming 74.1 per cent. Much of the water diverted from the streams is wasted by crude methods, and as yet no reservoirs for the conservation of storm water have been constructed. It is estimated that the

drainage area of the Pecos River within the Territory alone is susceptible of irrigating 13,000,000 acres of excellent land, or 250 per cent more than the aggregate of farm lands now in the entire Territory. By reason of recent congressional action in providing, by means of reservoirs, for the reclamation of the public lands of the arid region, however, agriculture in New Mexico will doubtless be greatly increased in the next few years. While possessing important mineral resources, New Mexico is pre-eminently an agricultural country, 41 per cent of the 66,396 persons pursuing gainful occupations being engaged in farming and stock-raising. The following table shows the acreage, yield, and value of crops in 1899 and 1909:

	1899	1909
Number of farms in state.....	12,311	35,032
Approximate land area in state (acres).....	78,401,920	78,401,920
Improved land in farms (acres)...	327,000	1,464,000
Total acreage of farms in state...	5,131,000	11,225,000
Average acres per farm.....	417	320
Value of farm land and buildings	\$20,889,000	\$111,430,000
Value of farm land.....	17,324,000	98,496,000
Value of buildings.....	3,565,000	12,934,000
Value of implements and machinery.....	1,152,000	4,101,000
Average value per acre of land and buildings.....	4.07	9.93
Average value per acre of farm land.....	3.38	8.77
Number of farms irrigated.....	7,884	11,399
Acreage irrigated.....	203,893	459,114
Per cent of number of farms irrigated.....	64.1	32.5
Per cent of improved land in farms irrigated.....	62.4	44.0
Total cost of irrigation systems.....	\$4,140,319	\$9,019,908
Average cost of irrigation per acre.....	\$6.40	\$13.97
Expenditures for labor.....	\$1,951,000	\$3,611,000
Expenditures for fertilizers.....	\$3,000	\$24,000
Number of white farmers.....	10,893	33,180
Number of non-white farmers.....	1,418	1,852

The principal crops for 1910, with their acreage yield and value, were:

Crops	Acreage	Yield	Value
Corn.....	70,000	1,610,000 bu.	\$1,449,000
Wheat.....	43,000	860,000 bu.	860,000
Oats.....	30,000	822,000 bu.	510,000
Barley.....	1,000	25,000 bu.	20,000
Potatoes.....	2,000	94,000 bu.	98,000
Hay.....	194,000	407,000 tons	4,680,000

New Mexico is the third state in the Union in the number of sheep of shearing age, with 3,200,000 in 1910, and being exceeded only by Montana and Wyoming. It produced, that year, 19,200,000 pounds of washed and unwashed wool and 6,720,000 pounds of scoured wool.

**Mineral Resources.**—The mining industry is important. From 1860 to 1890 \$17,600,000 in gold was produced; in 1908 the value of the yield was: gold, \$278,300; silver, \$171,200; copper, \$875,000; lead, \$95,000. Coal mining is extensively carried on, although only the fields adjacent to the railroads have been worked. The output of coal in 1907 (mostly bituminous) was 2,302,062 tons, valued at \$3,729,340. During that year about 94,000 tons of coke were produced, valued at \$250,000. Twenty-eight coal mines were in constant operation, with 2,500 operatives and a production of 1,400,000 tons. The coal area lies chiefly in McKinley, San Juan, Colfax,

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and Rio Arriba counties, in the northern and western parts of the State. The coal-bearing formations aggregate 1,850,000 acres, of which about 40 per cent is probably productive. Iron, salt, gypsum, clay, soda, ochre, potash, mica, marble, molybdenum, tungsten, and vanadium are also found, as are turquoise, garnets, opals, and chalcedony. Mineral springs are abundant.

**Political Divisions.**—The following table gives the counties, with their area, property assessment, population, and county-seats:

banks with 1,864 depositors and \$1,103,695.98 savings deposits; 22 State banks with 491 depositors and \$228,047.37 savings deposits; 4 savings banks with 1,575 depositors and \$415,471.54 savings deposits. There were no private banks or loan and trust companies reporting that year. New Mexico as a territory had public debts amounting to \$4,579,516 (\$998,923 State debt and \$3,580,593 other debts).

**Education.**—The number of public schools in the State in 1908 was 800, with 1,065 teachers. The school population (5-21 years) was esti-

COUNTY	Area (sq. m.)	Property assessment	Population (1910)	County-seat	Population
Bernalillo.....	1,567	\$3,103,120	23,606	Albuquerque.....(1910)	11,020
Chaves.....	9,599	2,939,012	16,850	Roswell.....	6,172
Colfax.....	3,897	2,981,411	16,460	Raton.....	4,530
Curry.....	New Co.		11,443	Clovis.....	
Dona Ana.....	3,818	2,189,899	12,803	Las Cruces.....(1900)	2,006
Eddy.....	6,506	1,037,014	12,400	Carlsbad.....	963
Grant.....	7,423	2,912,977	14,813	Silver City.....	2,735
Guadalupe.....	3,952	923,017	10,927	Santa Rosa.....	247
Lincoln.....	4,054	1,348,802	7,822	Lincoln.....	
Luna.....	3,024	1,502,691	3,913	Deming.....(1910)	1,864
McKinley.....	5,377	968,107	12,963	Gallup.....(1900)	2,946
Mora.....	2,542	1,175,823	12,611	Mora.....	741
Otero.....	6,870	1,570,864	7,069	Alamogordo.....	1,520
Quay.....	2,805	762,908	14,912	Tucumcari.....	
Rio Arriba.....	5,810	981,656	16,719	Tierra Amarilla.....	844
Roosevelt.....	3,110	649,164	12,064	Portales.....	353
Sandoval.....	3,959	792,565	8,570	Sandoval.....	
San Juan.....	5,598	679,491	8,504	Aztec.....	458
San Miguel.....	5,001	4,732,436	22,930	Las Vegas.....	3,552
Santa Fé.....	2,160	2,207,842	14,770	Santa Fé.....(1910)	5,072
Sierra.....	3,081	1,326,820	3,536	Hillsboro.....(1900)	557
Socorro.....	15,250	2,086,610	14,761	Socorro.....	1,512
Taos.....	2,265	677,820	12,008	Taos.....	1,225
Torrance.....	New Co.		10,119	Estancia.....	
Union.....	6,037	2,021,640	11,404	Clayton.....	750
Valencia.....	7,944	1,359,786	13,320	Los Lunas.....	458

**Climate.**—The climate is very dry and healthful, and has made the State justly celebrated as a resort for those afflicted with pulmonary troubles. The annual mean temperature ranges from 42.4° at Winsors, San Miguel County (8,000 feet), to 65° at Carlsbad, Eddy County (3,122 feet). The highest temperature averages approximately 112° at Carlsbad (25 June), and the lowest —12° at Bluewater, Valencia County (2 Feb.). The total precipitation on the average ranges from 22.42 inches at Carlsbad, to 4.66 inches at Deming, Luna County. Nearly half the precipitation (10.5 inches) at Carlsbad occurred in July. The greatest rainfall occurs between May and August, the least between February and April. The number of rainy days on the average ranges from 78 at Santa Fé to 18 at Albuquerque; average, about 40 days. The prevailing winds are southwest, west, southeast, and east. Although the summer temperature is sometimes high, especially in the southern part, owing to the dryness of the atmosphere the heat is never oppressive and the nights are always cool.

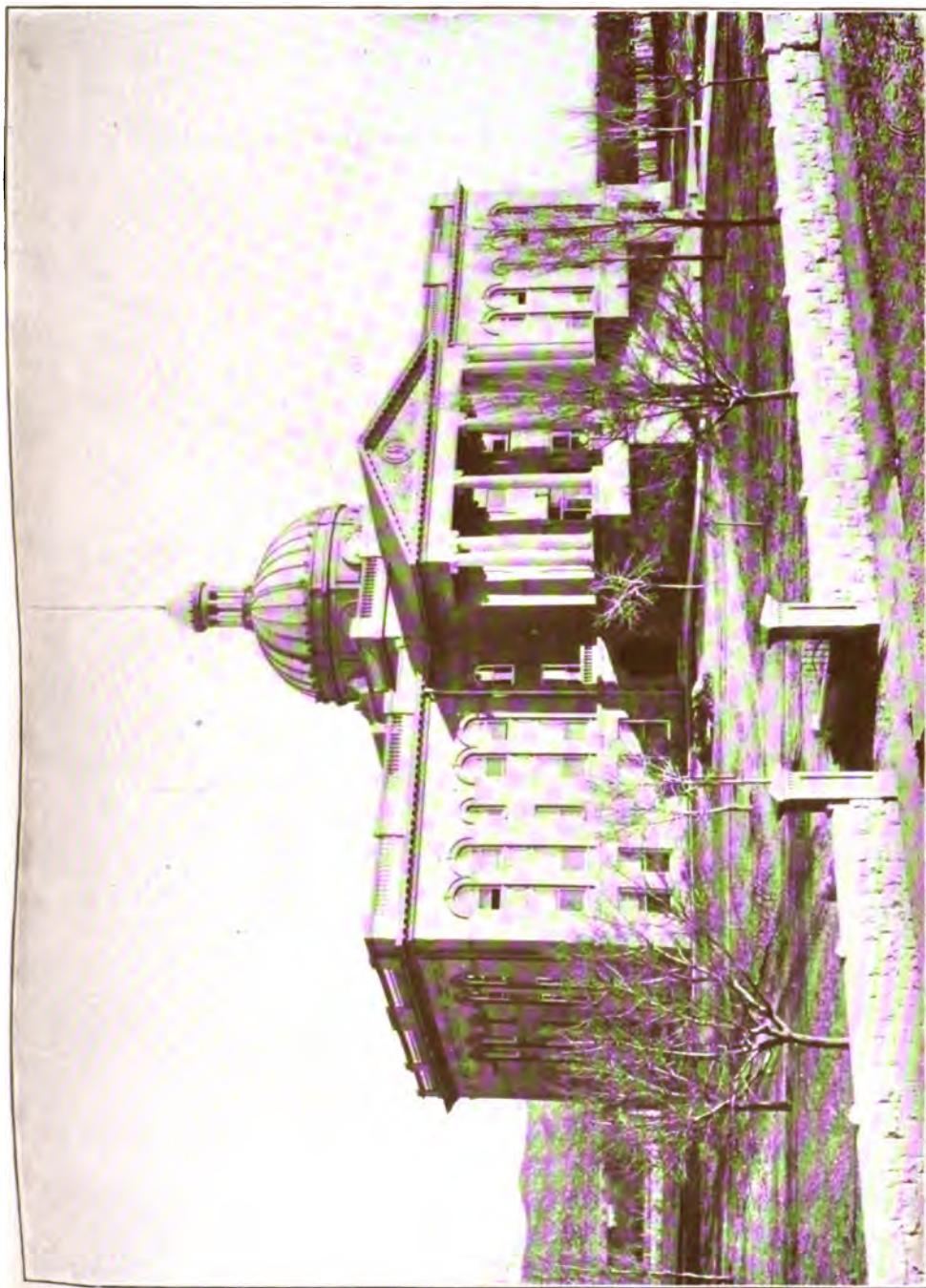
**Population.**—(1870) 91,874; (1880) 119,565; (1890) 153,593; (1900) 195,310 (native, 181,685; foreign, 13,625; males, 104,228; females, 91,082; white, 180,207; colored, 15,103—of whom 13,144 are Indians). Illiterates form 33.2 per cent of the total population. Census of 1910, 327,301.

**Finances.**—New Mexico had a total assessed valuation in 1910 of \$62,860,852, a bonded debt of \$998,000, and a tax rate of \$11 per \$1,000. The assessed valuation is 20 per cent of the actual value. There were in 1909 37 National

mated at 68,340, the enrolment 43,647, and the average attendance 26,844. The expenditure for public schools was \$484,060, and the value of school property \$700,000, exclusive of land grants. The State maintains the University of New Mexico at Albuquerque, the College of Agriculture and Mechanic Arts at Las Cruces; a Normal University at Las Vegas, a Normal School at Silver City, a School of Mines at Socorro, and a Military Institute at Roswell. The government supports Indian training schools at Santa Fé and Albuquerque, with 300 pupils each, also two boarding schools with 174 pupils, and 19 day schools with about 600 pupils. The educational facilities of the State have greatly increased in the last 10 years. There are 11 public, society, and school libraries, having 1,000 volumes or more, aggregating 27,732 volumes, or 14 books per 100 population.

**Religion.**—The population consists largely of Roman Catholics, who have an archbishop, a bishop, a vicar-general, 16 regular priests, 43 secular priests, 42 churches, 325 mission churches, 6 academies for young women, a college, 8 parochial schools, 2 Indian boarding schools with 300 pupils, 2 day schools for Indians with 200 pupils, and 2 academies for boys. The Baptists have 36 churches, a college, and several mission schools; the Methodists 17 English-speaking and a number of Spanish-speaking congregations, together with a number of mission schools; the Presbyterians 45 congregations, 30 preaching stations, 25 mission schools with 45 teachers and 1,562 pupils; the Mormons 2 churches with 277 members. Other Protestant denominations have

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CAPITOL AT SANTA FE.





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about 20 congregations, and the Hebrews 5 organizations and 2 synagogues.

*Charitable, Penal, etc.*—The Territory supports an asylum for the insane at Las Vegas, an asylum for the deaf and dumb at Santa Fé, an institute for the blind at Alamogordo, a miners' hospital at Raton, a reform school at El Rito, and an orphanage at Belen. The Territorial Penitentiary is situated at Santa Fé. A hospital and orphanage at Santa Fé and a sanatorium at Albuquerque are supported by the Roman Catholic Sisters of Charity; there are also two hospitals at Silver City, one at Deming, and one at Carlsbad, all of which are supported in part by the Territory. Government sanatoria are in successful operation at Fort Bayard and Fort Stanton, where several hundred soldiers and sailors from all parts of the country have been cured of pulmonary tuberculosis. There are also several private sanatoria in the Territory.

*Transportation.*—The total railroad mileage of New Mexico is about 3,000, an increase of 1,000 miles in 10 years.

There are about 400 post-offices and 70 periodicals (5 daily, 60 weekly, 5 monthly).

*History.*—For untold generations before the discovery of America, New Mexico was the home of sedentary tribes of Indians—the ancestors of the present Pueblos—as well as of nomadic predatory tribes. The former constructed villages, principally of stone, on the mesas, in the shelves of rocky cliffs (see CLIFF-DWELLERS), and in the valleys. Their numbers considerably exceeded that of their descendants of to-day, but there is no reasonable ground for the generally popular belief that New Mexico ever contained a teeming sedentary aboriginal population, notwithstanding the hundreds of ruins scattered throughout its area, particularly west of the Rio Grande. There is definite historical as well as traditional evidence that many of the pueblos occupied at the time of the discovery of the Southwest were later abandoned on account of Apache and Navaho raids, or by reason of epidemics, the failure of water supply, through superstition, or the efforts of early Spanish missionaries to concentrate the natives. Many ruined pueblos in the Territory may thus be accounted for; for although Coronado in 1540-2 recorded 64 inhabited villages, some of them extensive, only two (Acoma and Isleta) of the 17 which remain still occupy their 16th century sites. The recorded history of New Mexico dates from 1539, in which year Marcos de Niza, a Franciscan friar, accompanied by a Barbary negro named Estevan, or Estevanico, traversed the country from Mexico to the Zuñi Indian villages, then known as the "Seven Cities of Cibola," in the western part of the Territory. Estevan, preceding Fray Marcos during the latter days of the journey, was killed by the natives at their village of Hawikuh, one of the seven towns; Niza followed, viewed the pueblo from an adjacent height, and fled back to Mexico. In February of the following year Francisco Vazquez Coronado, guided by Niza and accompanied by a large force, marched from Compostela, Mexico, to Cibola, storming and capturing Hawikuh (which he named Granada), in July. Expeditions sent out from here by Coronado resulted in the discovery of the Hopi or Moqui villages (called Tusayan) in north-

eastern Arizona, and the Grand Cañon of the Colorado. In the autumn the army moved to the province of Tiguex, in the vicinity of the present Bernalillo, on the Rio Grande, where winter quarters were established and whence parties were sent to visit the neighboring pueblos.

In the spring of 1541 Coronado crossed the Pecos River into the present Texas and northward through the buffalo plains to the Wichita settlements of Kansas—the "Province of Quivira"—where several months were spent in exploration; but gold, which formed the object of the dreary march, was not found. The expedition returned to the Rio Grande, and thence to Mexico in the spring of 1542, having spent nearly two years in the country. Two friars remained in New Mexico and one in Kansas, but these were killed by the Indians. New Mexico was visited in 1581 by Francisco Sanchez Chamuscado, with a small escort and three Franciscans, the latter being left among the Rio Grande Pueblos. These were killed after Chamuscado's departure. Late in 1582 Antonio de Espejo, with a bodyguard, was authorized to explore the new province and to learn the fate of the missionaries. Following the route of Chamuscado up the Rio Grande, he reached Puala, or Puaray, near the present Bernalillo (the principal town of Coronado's Province of Tiguex), where the friars had been slain, the Indians fleeing on his approach. From this point Espejo extended his travels to the pueblos of Sia, Jemez, Acoma, and Zuñi, and to the Hopi towns of Arizona, thence eastward to the Rio Pecos and back to Mexico. The next important event was the colonization of New Mexico by Juan de Oñate, the first governor of the province, who reached the new country via the Rio Grande in 1598 with about 400 colonists, and established the town of San Francisco de los Españoles, later known as San Gabriel, where Chamita, at the mouth of the Rio Chama, now stands. All the sedentary tribes were visited and their vows of obedience and vassalage taken, and the country from eastern Kansas to the head of the Gulf of California explored between 1598 and 1605. In the latter year San Gabriel was abandoned and the seat of government moved to Santa Fé, which dates from this time. During the following few years the new colony barely existed; in 1617 it had only 48 soldiers and colonists, although the missionaries had been so zealous that 11 churches had been built and 14,000 natives baptized. In 1680 the Pueblos rebelled against Spanish authority, killed many missionaries and colonists, and laid siege to Santa Fé, where the panic-stricken survivors had taken refuge in the adobe Palace, which still stands. Governor Otermin finally succeeded in driving the Indians off with considerable loss, and in retreating down the Rio Grande to El Paso, Texas, with a thousand followers, leaving the natives in almost uninterrupted possession of New Mexico until 1692. In that year Diego de Vargas reconquered the province, with great loss to the Indians, enabling its resettlement toward the close of the year by 800 colonists. In 1696 the Indians again revolted, killing five friars and 21 other Spaniards, and it was not until the close of the century that the Pueblos were entirely overcome.

Henceforward New Mexico grew in im-

## NEW MEXICO COLLEGE — NEW ORLEANS

portance; new towns were established in the Rio Grande Valley, which slowly increased in population despite the constant depredations of the Apaches and Navahos. Early in the 19th century a considerable trade sprang up between the province and the settlements along the American frontier, notably Kaskaskia in Illinois, and later Franklin and Independence in Missouri, which increased from \$22,000, in 1822 to \$750,000 in 1844. This was the beginning of the overland commerce via the famous Santa Fé trail, which came to a close when the Atchison, T. & S. F. Railroad entered the Territorial capital in 1880. Mexico having thrown off the yoke of Spain in 1821, New Mexico became a Mexican province; in 1824 it was made a territory, and in 1836 a department, remaining such until 1846, when it was taken possession of by General Stephen W. Kearny in the name of the United States. In 1848, by the Treaty of Guadalupe Hidalgo (q.v.), New Mexico, the boundaries of which were very indefinite, but which comprised Arizona north of the Gila (see GADSDEN PURCHASE), and a part of Colorado, was ceded to the United States, and on 25 Nov. 1850 the Territory was organized through the agreement by Texas to the New Mexico boundary, under the Act of Congress approved 9 September. In 1863 western New Mexico became the Territory of Arizona, and in 1865 a northern strip was annexed to Colorado.

New Mexico was the scene of several conflicts during the Civil War, notably the defeat of the Federals under Canby, by the Texans under Sibley at Valverde in February 1862. Santa Fé was occupied by the Union forces in March; Sibley took possession of it a week later, but was forced to evacuate in April, after the defeat of the Confederates in Apache Cañon. Unsuccessful efforts for the admission of New Mexico as a State have been made for many years, notably in 1906 when Arizona voted adversely on the Statehood bill. On 16 June 1910 the Senate passed the bill granting statehood to New Mexico, among the last of the remaining territories. This bill specifically provides, however, that the proposed State hold no legislative sessions prior to the first of January 1912. It also stipulates that the State shall set aside 100,000 acres for a State penitentiary.

F. W. HODGE,

*Smithsonian Institution, Washington, D. C.*

**New Mexico College of Agriculture and Mechanic Arts**, opened in 1891, at Mesilla Park. It does not share in the United States land grant of 1862, but receives the annual appropriation from the Federal government provided for in the law of 1890, and also receives annually an appropriation from the Territory. The regular four years' courses are general scientific, agriculture, and mechanical engineering, on completion of which the degree of B. S. is conferred. There are in addition two years' courses in agriculture and practical mechanics, a 12 week's course in agriculture, and horticulture, a one year course in stenography and typewriting, graduate courses, and a preparatory department (five years' course). The college is coeducational, women forming about one-half the number of students; there are also women on the faculty.

**New Mexico, University of**, situated at Albuquerque, incorporated in 1889 by the legislature of the Territory, and intended for the State University when New Mexico is admitted to the Union. It was first opened in 1892, and new departments subsequently added till the organization now includes the collegiate department (classical and scientific courses), the departments of music and art, a business school, and normal and preparatory departments. The degrees of bachelor of arts and bachelor of pedagogy are given; also master of arts and doctor of philosophy. Women are admitted on equal terms, and a cottage for their use has been built on the campus. Connected with the university is the Hadley Climatological Laboratory devoted particularly to the investigation of the effect of the dry and plateau regions of the United States upon health and disease.

**New Milford, Conn.**, town, county-seat of Litchfield County; on the Housatonic River, and on the Berkshire division of the New York, N. H. & H. railroad. It was settled in 1707 by John Noble from Westfield, Mass., and later a colony from (Old) Milford Conn., located at New Milford. It is situated in a hilly country which has considerable good farm land; tobacco is the great specialty. The extensive water-power of the Housatonic is being utilized by means of a canal two miles long, which extends from Bulls Bridge to New Milford. The New Milford Power Company who own the plant, will furnish electricity to towns at a considerable distance. The tobacco warehouses have over 500 employees; the wood finishing factory, 90; the hat factory, 285; upholstery works, 40; lime works, about 60. There are several other smaller manufacturing establishments. A library and Memorial Hall for the free use of the Grand Army veterans, the town hall, the churches, and schools are all fine buildings. The educational institutions are good public schools, Ingleside School for young women, and Weantstrong School for boys. The government is administered by three selectmen chosen annually by the people. Pop. (1910) 5,070.

J. A. BOLLES,

*Editor 'New Milford Gazette.'*

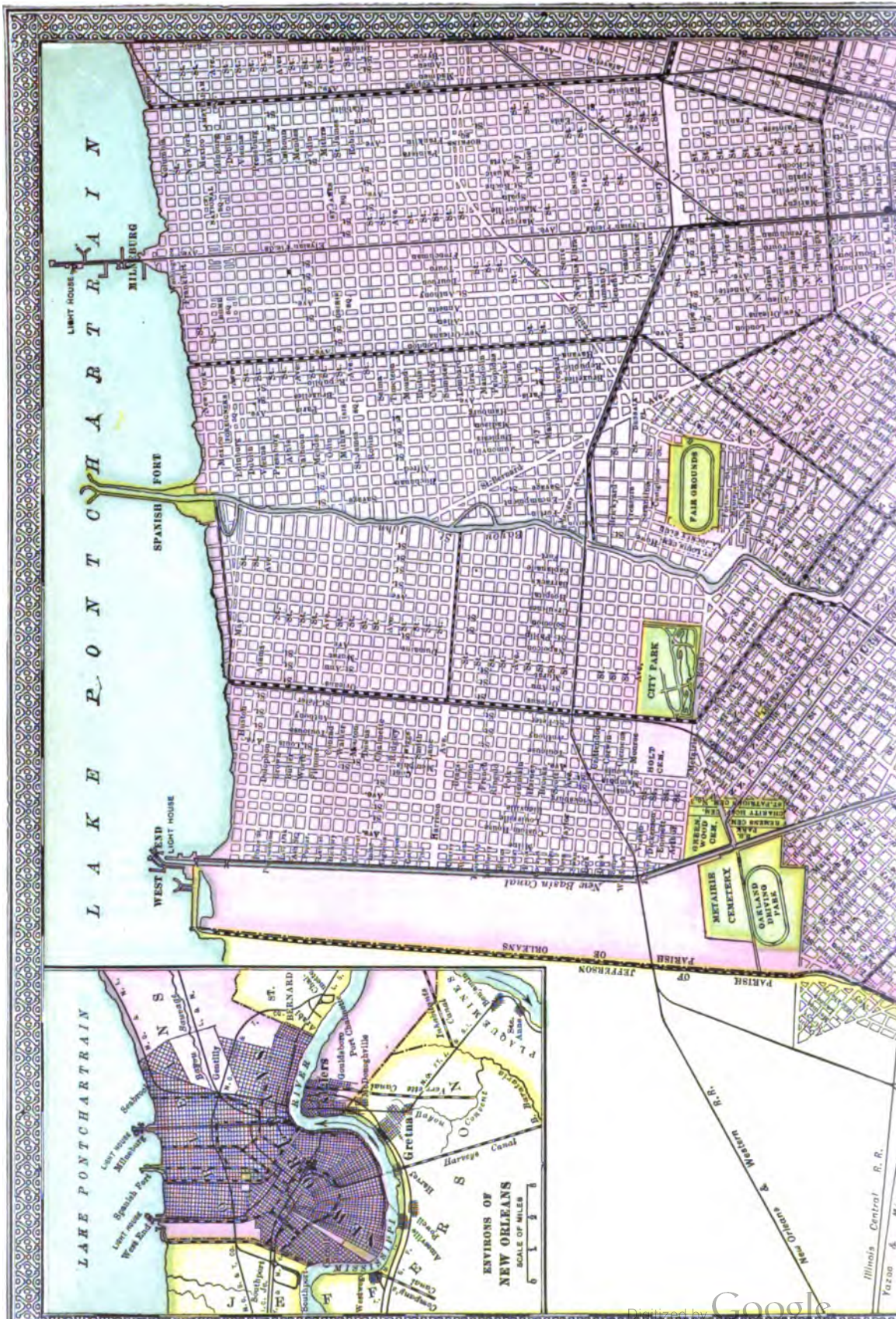
**New Netherlands**, neth'ér-landz, the name given by the Dutch to the colony they established in America in 1626. A British fleet, under command of Richard Nicolls, captured the place in 1664; and by order of Nicolls, the Duke of York was made ruler and the name changed to New York. See NEW YORK.

**New Or'ange**, a name applied to New York in 1673, when the colony of New Netherlands was retaken from England by the States-General of Holland. The name was used in honor of the Prince of Orange.

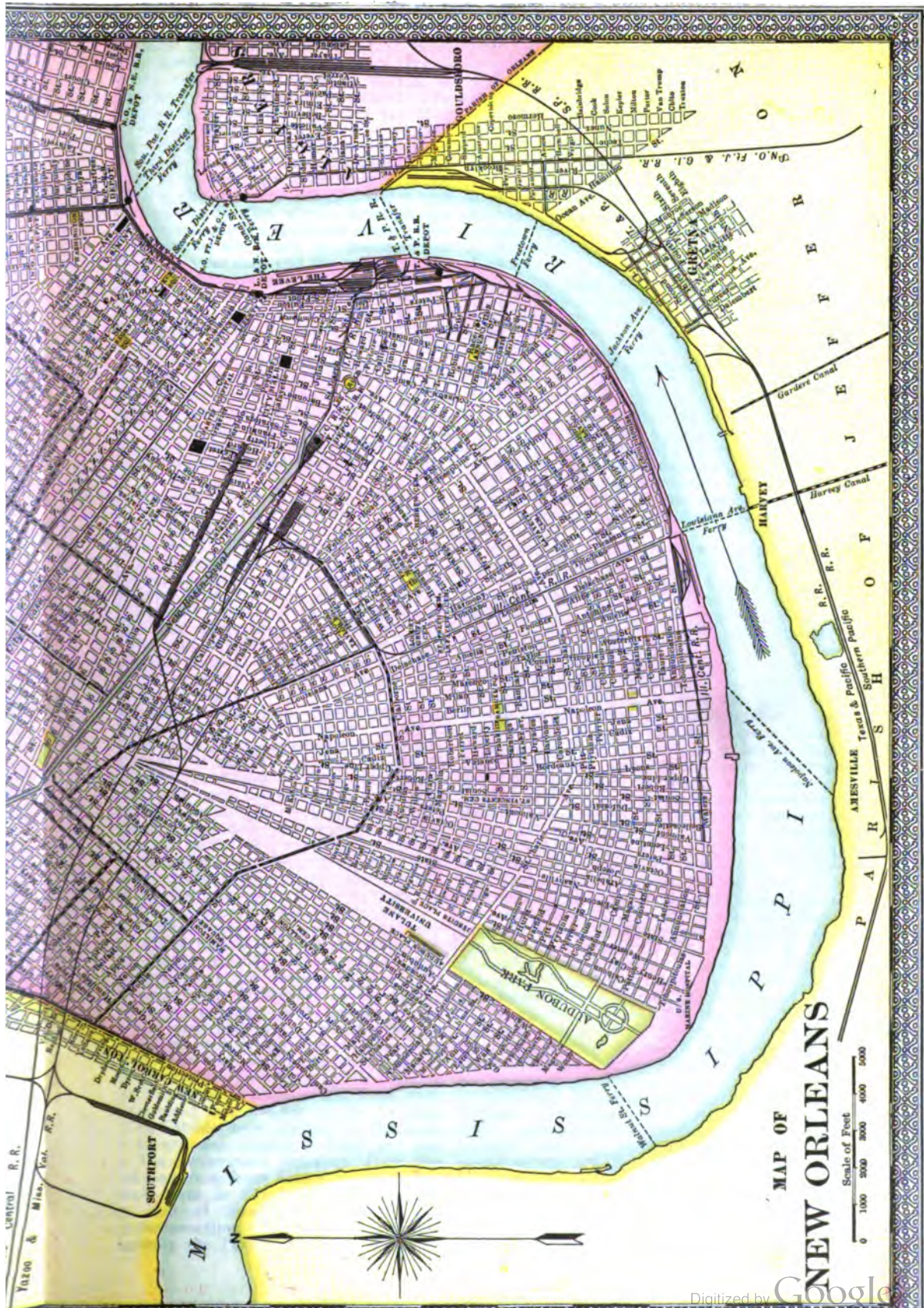
**New Orleans, La.**, the twelfth city of the United States in population, and the largest south of the Potomac and Ohio rivers, is situated on the Mississippi River, 107 miles from its mouth. Built in a bend, it was originally crescent-shaped, whence its title of "the Crescent City." It has spread out in all directions, and has even taken in the suburbs on the west bank of the river, so that the resemblance to a crescent has completely disappeared.











MAP OF  
NEW ORLEANS

Scale of Feet  
0 1000 2000 3000 4000 5000





## NEW ORLEANS

**Area and Drainage.**—The corporate limits cover 189 square miles, including a large area of uninhabited swamp. The improved portion is 26,026 acres, or 41 square miles, in extent. The site of the city is several feet below the level of the river at extreme high water. The land is mostly flat, and slopes back from the Mississippi, draining into Lake Pontchartrain. These conditions have made the problem of draining and sewerage of the city very difficult; and it was finally solved only in 1895, when a threefold system was adopted, the sewage being emptied into the Mississippi on the south, the drainage into Lake Borgne on the east, and the ordinary rainfall into Lake Pontchartrain on the north.

In consequence of these improvements important changes have taken place in the soil and climate, which have been rendered much drier; and whereas because of the saturation of the soil it was formerly thought impossible to erect buildings more than three or four stories high, "sky-scrapers" are now built as in other American cities. As early as 1728 levees or dikes were built in front of the city to protect it against freshets. It is now surrounded by levees, and no portion of it has suffered from flood for over 50 years.

**Climate.**—The climate is mild and damp. A "freeze" is rare, and the thermometer has been below 17° F. only once. The mean temperature is 69° F. The summers, while long, are not excessively hot, as the nights are cool, and prostrations from sunstroke are much rarer than in other large American cities. Formerly the city suffered severely from malarial fevers, but these have disappeared with sanitary improvements, and in 1902 the death-rate among the whites had fallen to 17.2, a decrease of nearly one half, in 20 years. Among the negroes the mortality is still high.

**Population.**—In the years 1830-60 New Orleans increased in population from 46,310 to 168,875; the next 30 years brought the number up to 242,039; in 1900 it was 287,104; and, in 1910, 339,075. The creoles, of French and Spanish origin, and once the dominant element in politics and business, still constitute one fourth of the white population, and largely determine the social tone of the city, most of the customs and usages being borrowed from them—holidays, public celebrations and balls, the carnival, the cuisine, fashions, etc. The American influence, however, is increasing steadily.

**Architectural Features.**—A wide central thoroughfare, Canal Street, the shopping centre, divides the old French city, *le Vieux Carré* (the Old Square) from the newer districts. The former is built in the French and Spanish architecture of a century ago. A large part of the old city was destroyed in the fire of 1788, but many buildings still remain which date back from before the fire, and there are hundreds over a century old. The oldest public building is the Archbishopal Palace, dating from 1737, originally erected as a convent for the Ursuline Nuns. The Cabildo, now occupied by the State Supreme Court, was erected in 1795, and was formerly the government building. Here the cession of Louisiana from France to the United States took place in 1803. The Civil Court Building, also of Spanish architecture, was erected at the same time. The Saint Louis Cathedral, originally the Parish church of New Or-

leans, was erected in 1723. It was twice destroyed, once by a hurricane, again by fire, and was rebuilt in 1794. The Church of St. Anthony de Padua (Italian) was formerly the mortuary chapel of the old Saint Louis cemetery. In this quarter the residences are of a characteristic architecture styled "creole," largely modeled on the plantation homes of the West Indies, the dwellings being of wood or of brick and stucco. In the more densely populated section they have large courtyards in the centre; in the suburbs they are surrounded by wide verandas or "galleries," and shaded by an abundance of shrubbery.

Besides those already mentioned, the more important public buildings are the custom-house, of New England granite and solid Egyptian architecture—for many years the largest public building in this country; the Cotton Exchange, of florid Renaissance; the Saint Louis Hotel, at one time the largest in the United States, and used for some years as the Louisiana State-house; the United States Mint, Tulane University, Newcomb College, the Public Library, Howard Memorial Library, Tulane Hall, the Church of the Immaculate Conception (Jesuit), with college attached; Christ Church Cathedral, criminal courts, city-hall, and the French Opera-house, the oldest opera-house in this country.

**Parks, etc.**—The city is somewhat deficient in parks. The City Park is geographically central, in what was formerly used as a dueling ground. Audubon Park, fronting on the Mississippi, was the de Boré plantation, on which sugar was first produced in Louisiana. Both are well shaded by immense live oaks over a century old. Audubon Park has a handsome horticultural hall, erected in 1884, containing a fine collection of tropical trees and plants, and here is also a model sugar and cotton farm—the Audubon Experiment Station. Jackson Square, formerly the Place d'Armes, on which the Saint Louis Cathedral, Cabildo, and court buildings face, was laid off at the foundation of the city, and was the centre of New Orleans history for a century and a half. It contains an equestrian statue of Gen. Andrew Jackson. Beauregard Square was formerly Congo Square, the gathering place of slaves in the earlier days. Lafayette Square, on which the city-hall faces, contains statues of Henry Clay and John McDonogh, who left his large fortune to educational purposes. Lee Circle contains a tall pillar surmounted by a statue of Gen. Robert E. Lee. Margaret Place contains a statue of Margaret Haughery, "the friend of the orphans." Jackson Barracks, the United States army station, has extensive grounds. On the west side of the river is the United States Naval Reservation, with a large floating dock for the use of men-of-war and a naval station in the course of construction.

**Municipal Divisions and Government.**—New Orleans is divided into seven municipal districts, corresponding with the towns or "faubourgs" that have at different times been annexed to the original city, and 17 wards. Its assessed valuation is \$156,500,000. The government is administered by a mayor and council, but most of the municipal functions are under the control of appointive boards or commissions.

**Banking.**—New Orleans is the most impor-

## NEW ORLEANS

tant banking centre of the Southwest. It has eight national, seven state, and five savings banks, with a capital of \$15,890,150, deposits of \$58,579,600, and resources of \$77,356,346.

**Commerce.**—New Orleans is the second port of the United States, being exceeded in commerce only by New York. Its commerce, foreign and coastwise, amounts to \$720,000,000 a year. The Mississippi River, which is the chief channel of trade, is from 1,800 to 3,600 feet wide and from 60 to 240 feet deep. Including the commercial suburbs of Port Chalmette, Gretna, and Westwego, New Orleans has a frontage on the river of 26 miles, lined throughout the greater part with wharves and docks. The present channel through the Eads jetties in South Pass permits vessels drawing 30 feet of water to ascend from the Gulf of Mexico to New Orleans. Work was begun in 1903, to be completed in 1908, on a new outlet through Southwest Pass, which will admit vessels drawing 35 feet of water.

New Orleans is the largest cotton port in America and has the largest export of cottonseed-oil and by-products. It is first in the importation of tropical fruits, and second in coffee. Its export is also large in hides, wool, lumber, staves, rice, flour, tobacco, and all the products of the South and West.

The railroads centring at New Orleans are the Southern Pacific, Texas & Pacific, Louisville & Nashville, Southern, Illinois Central, Yazoo & Mississippi Valley, New Orleans & Northeastern, St. Louis & San Francisco, Shreveport & Red River Valley with two local lines, the New Orleans & Southern, and the New Orleans, Fort Jackson & Grande Isle, all together operating or controlling 49,363 miles of road.

All the lines have extensive yards and terminal facilities, the most important being those of the Illinois Central at Stuyvesant Docks, with a mile front on the Mississippi, and those of the Southern and the St. Louis & San Francisco at Port Chalmette, with three miles of front on the river and improvements to cost \$15,000,000.

The Mississippi River, besides offering wharfage for ocean vessels, is the source of a large steamboat and barge traffic, extending to all parts of the Mississippi Valley. The Carondelet and New canals give access to Lake Pontchartrain and Mississippi Sound, and handle a large trade in coal, iron, lumber, building materials, and naval stores. There are from 5,000 to 6,000 arrivals per year by canal, generally of small vessels.

**Manufactures.**—The manufacturing interests have greatly developed since 1885. New Orleans has now the largest manufacture of cottonseed-oil and by-products; the largest milling of rice; and is one of the chief centres of sugar-refining, and of the manufacture of lumber, clothing, bags, cigars, and cotton goods. The census of 1909 returned 848 manufacturing establishments, having \$56,934,000 capital, and products valued at \$78,794,000. This output shows an increase of over \$90,000,000 since 1903.

**Educational and Charitable Institutions.**—The educational facilities of the city have been greatly improved and extended in recent years. Tulane University has four departments, law, medicine, the arts, and sciences, and Newcomb College for the higher education of women, all well endowed. It has 67 teachers and 1,350

students. The College of the Immaculate Conception has an average annual attendance of 400 students. There are also a college of pharmacy and a college of dentistry, besides numerous minor educational institutions. There are four colleges for negroes: Southern University (supported by the State), New Orleans University (Methodist), Leland University (Baptist), and Straight University (Congregational), with 60 teachers and 3,400 students, mainly in the preparatory grades. The public school system includes three high schools and 69 grammar and preparatory schools, with an average attendance of 32,000 children. The private and parochial (mainly Catholic) schools have an average attendance of 12,000 pupils. The Ursuline Convent, for the higher education of girls, is the oldest school of its kind in the United States, having been in uninterrupted session since 1720. Newcomb College, established in 1887, has done much for the development of education and art among the women of Louisiana. The three libraries—the Fisk and Public Libraries, the Howard Memorial, and the State Library—have a total of 180,000 volumes.

Most important among the charitable institutions is the Charity Hospital, founded in 1782. It is supported by the State, has 850 beds, accommodates an average of 8,500 patients, while 20,000 to 25,000 more are given outside treatment each year. Connected with it is the Richard Milliken Hospital for children. The Eye, Ear, Nose and Throat Hospital is also a charity institution. Other hospitals are the United States Marine Hospital, the Touro Infirmary, Hotel Dieu, New Orleans Sanitarium, and the Louisiana Retreat, the last for the insane. There are 47 asylums with 3,500 inmates, receiving small appropriations from the city, but maintained mainly by charity or endowment funds.

**Churches.**—There are 294 churches, of which 203 are for whites and 91 for negroes. The Catholics, with 41 churches, are strongest in point of numbers. The Baptists have 66 churches, of which 61 are for negroes; the Methodists 39, of which 21 are for negroes; the Episcopalians 14, Presbyterians and Lutherans 13 each. There are also 6 Jewish synagogues.

**Cemeteries.**—The cemeteries number 33, some of them being in the central portion of the city. The dead are usually buried above ground in vaults on account of the humidity of the soil. The National Cemetery at Chalmette contains the bodies of many Union soldiers.

**History.**—The site of New Orleans, on which stood a village of the Houma Indians, was first visited in 1699 by a French expedition under Bienville, who in 1718 obtained the consent of the French government to the establishment of a colony there, and the city was laid out and named in honor of the French regent, the Duc d'Orléans. In 1726 it was made the capital of the French colony of Louisiana, which then included nearly all the Mississippi Valley. The first colonists, either Frenchmen or French Canadians, were reinforced by settlers from the West Indies and Germans sent over by John Law (q.v.). The province having been transferred to Spain in 1763, a Spanish force was sent to take possession of New Orleans, but was driven out by the inhabitants, who established a government of their own, to which the Spaniards put an end in 1769. The population, at that time,

NEW ORLEANS.



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JACKSON SQUARE AND CATHEDRAL.



## NEW ORLEANS — NEW ORLEANS UNIVERSITY

3,190, was greatly increased during the period of Spanish domination by accessions from Spain, the Canary Islands, and Santo Domingo, and of French Acadians from Nova Scotia. The original population was never friendly to Spain. By Spanish governors New Orleans was walled and surrounded with fortifications. At the time of the Louisiana Purchase (q.v.), in 1803, its inhabitants numbered 11,856; its commerce was large, and its society, which included many families of wealth and culture, was noted for fashion and refinement.

New Orleans was incorporated as a city in 1804. When, in 1812, Louisiana (q.v.) was admitted to the Union as a State, the city was its capital, as it had been that of the province, remaining such until 1852. From 1865-80 it was again the State capital.

On 8 Jan. 1815 occurred the battle in which Gen. Andrew Jackson defeated the British army under Gen. Pakenham. It was fought at Chalmette, now a suburb of the city.

The racial jealousies existing between the creoles and the new comers or Americans led to division of New Orleans in 1836 into three municipalities, each with a government of its own. They were consolidated again in 1852, at which time New Orleans was the third city in population in the Union, and was disputing with New York the first place in commerce.

Soon after the secession of Louisiana from the Union and the establishment of the Confederate government, New Orleans was blockaded by the Federal fleet under Farragut. It was captured in April 1862. A succession of misfortunes followed the Civil War—epidemics, political troubles, and the inundation of the surrounding country. The city for a time increased slowly in population and actually declined in commerce and business. Improvement began in 1879, with the Eads jetties, which enabled vessels of larger draft to enter the Mississippi. A more marked gain came in 1896 in the way of improved sewerage and drainage, for which the people voted a special tax of \$16,000,000. Better sanitary conditions were secured, and then followed the increase and extension of railroad facilities, the opening up of new territory to trade, and the development of manufacturing industries, all leading to the present rapid growth and sustained prosperity of the city.

NORMAN WALKER,

*Associate Editor 'Times-Democrat.'*

**New Orleans, Battle of, The,** in American history, an engagement fought on 8 Jan. 1815, between a force of 12,000 British under Sir Edward Pakenham, and one of 6,000 Americans under Gen. Andrew Jackson. The latter were in a strongly entrenched position and awaited Pakenham's assault on their lines. The battle lasted only 25 minutes, when the British fled, leaving behind them 2,600 killed and wounded. Pakenham was among the slain. The Americans' loss was only 8 killed and 13 wounded. In this battle the weight and precision of the American fire were such that no troops in the world could have stood against it. One British authority says that not even from Saint Sebastian had so severe a fire been poured upon an attacking force. One British regiment, the 93d Highlanders, distinguished for its services in many parts of the world, lost more than half

its men, having been brought to a point where it could do no good, but where it could be most effectually operated upon by the Americans. The British troops never behaved better, but they were badly handled.

**New Orleans, Capture of, in 1862.** The Civil War engagement which resulted (24 April) in the taking of New Orleans, was actually fought 70 miles down the Mississippi. The great bend next below the city was commanded by Fort Jackson on the west (north) bank, and Fort Saint Philip on the east. Supposed to mount 150 guns each, they had in fact 109 together, over half of them only 24's; and the garrison was largely Northerners and foreigners. The river was blocked by a chain buoyed by 11 steamer-hulks, and there were fire-raft and boats above. Farragut's fleet comprised 17 wooden vessels with 154 guns; besides six gunboats with 30 guns and 20 mortar-schooners with one gun each, under command of David D. Porter (q.v.). Bombardment on the forts was opened 18 April; and on the night of the 20th a Union vessel hugging the bank got above the boom, and coming down with a full head and current, snapped the chain and left the channel free. After three days' more bombardment it was determined to pass the forts instead, in the dark, and on the morning of the 24th, about 2:30, the vessels steamed forward in two columns, Farragut leading one in the Hartford, Capt. Theodorus Bailey the other, while the mortar-boats shelled the water-battery commanding the approach to Fort Jackson. All but the last three of Farragut's column succeeded in passing the boats before daylight made it impossible, the vessels' guns in turn driving the fort gunners from their posts. Above, the Confederate flotilla of 17 vessels inflicted great damage, one Union gunboat being sunk, one badly crushed by a ram and the Hartford fired by a fire-boat. Nine Confederate vessels were sunk or captured, however, and the Union fleet proceeded to New Orleans and compelled it to surrender. On the 28th the forts also capitulated. It is due to history to add that of the 17 Confederate vessels, 9 of which were rams and 2 ironclads, only 4 vessels and 12 guns were in such condition as to be capable of making a fight. If the materials of the force of John K. Mitchell, the Confederate commander, had been completed, his little fleet could have made a very creditable defense; but J. R. Soley, of the United States navy, truly says that no commander, taking hold of his vessels in their incomplete condition four days before the fight, could have made much out of them. This victory of Farragut's prevented Louis Napoleon from recognizing the Confederacy and raising the blockade, and hence was one of the most important of the war.

JOSEPH T. DERRY,

*Author of 'History of Georgia.'*

**New Orleans University,** in New Orleans, La.; coeducational, founded in 1873 under the auspices of the Methodist Episcopal Church. It has preparatory and collegiate departments, and its courses lead to the degrees of A.B., B.S., and Ph.D. In 1910 there were connected with the school 52 professors and instructors and nearly 930 students. The library contained over 6,000 volumes, the grounds and buildings were

## NEW PHILADELPHIA — NEW SOUTH WALES

valued at \$130,000, the productive fund was about \$12,000, and the income about \$8,000.

**New Philadelphia**, Ohio, city, county-seat of Tuscarawas County; on the Tuscarawas River and the Ohio Canal, and on the Pennsylvania and the Cleveland, L. & W. R.R.'s; about 100 miles northeast of Columbus and 90 miles south of Cleveland. It was settled in 1805 and incorporated in 1808. It is in an agricultural region, but its good water-power and facilities for transportation have contributed toward making it a manufacturing city. Some of the manufactures are pressed, stamped, and enameled goods, steel products, flour, woolen goods, brooms, canned goods, tile, and wagons and carriages. Shorenbraun Springs and Springer's Park are of interest. The mayor is elected biennially, and the council appoint or elect the administrative officials. Pop. (1910) 8,542.

**New Philippines**, fil'p-pīnz or -pēnz, a name sometimes given to the Caroline Islands (q.v.).

**New Pla'tonists**. See NEO-PLATONISM.

**New Pomerania**, or Neu Pommern, noi pōm'ērñ, formerly NEW BRITAIN, the largest island of the Bismarck Archipelago (q.v.), 50 miles distant from Kaiser Wilhelm's Land, New Guinea, Rock Island and the Dampier, and the Vitiaz straits, intervening. It is crescent shaped, 300 miles long, with a maximum breadth of 90 miles, and an estimated area of 9,500 square miles. There is a German mission and trading station on the northeast coast. The inhabitants are savage Papuans.

**New Providence**, one of the Bahama Islands (q.v.), northeast of Andros Islands and about 300 miles east by north of Key West. In 1629 the first English settlement on the Bahamas was made on New Providence. This island has the best harbor of any of the group. Nassau (q.v.), the capital of the islands, is on New Providence. Although this island, as all of the group, belongs to Great Britain, it is a part of Roman Catholic archdiocese of New York.

**New Red Sandstone**, in geology, a term formerly used, in contra-distinction to Old Red Sandstone (q.v.), of red shale, loam and sandstone lying above the coal measures. The nomenclature is faulty, being based only on a color distinction, and it is now recognized that the rocks formerly grouped under this name are at two very different eras, the Permian and Triassic (qq.v.).

**New River**. See GREAT KANAWHA.

**New Rochelle**, rō-shēl', N. Y., city, in Westchester County; on Long Island Sound, and on the New York, N. H. & H. railroad; 16½ miles from the Grand Central Station in New York city. It has connection by electric railroads and trolleys with New York city and several of the villages and cities in the vicinity. It was settled in 1687 by Huguenots, and was named after La Rochelle, France. It has a beautiful location, and is considered a desirable residential city by a large number of the business men of New York. It has a well-kept park, and Glen Island, Echo and Neptune bays are nearby. The prominent buildings are a number of old colonial edifices, several of the churches, especially Saint Gabriel's (R.C.), with

its parish school building, both gifts of Adrian Iselin, the Masonic Temple, a hospital, Knights of Columbus and the city buildings. The water supply is exceptionally pure; and the vital statistics show a low death rate. It is the seat of the Ursuline Seminary of Saint Teresa, founded in 1898, and it has several private schools, good public and parish schools, and a public library which contains about 9,000 volumes. Thomas Paine resided here for some years. At present (1904) it is the home of a number of well known authors and artists. Pop. (1890) 9,057; (1900) 14,720; (1910) 28,867.

**New Roof**, *The*, a term used in early American history for the Federal Constitution.

**New Sallee**, sā-lā', Morocco. See RABAT.

**New Sarum**, sā'rūm. See SALISBURY.

**New School Presbyteriana**. See PRESBYTERIANISM.

**New Shet'land**. See SOUTH SHETLAND ISLANDS.

**New Sibe'ria**, or Liakhof (lē-āh'ōf), *Islands*, a group of islands in the Arctic Ocean, off the north coast of Siberia, between the mouths of the Lena and Indigirka, and administratively attached to the government of Yakutsk. The group comprises Liakhof, Maloi, New Siberia, Thaddeus, Kotelnoi, and Bennett Islands; the area is estimated at 20,480 square miles; they are rocky, treeless, icebound all the year round, and uninhabited. Reindeer, foxes, and white bears are found, and there is immense wealth in fossil ivory, the remains of mammoth, rhinoceros, and buffalo.

**New Som'erseshire**, in American history, a name given the territory extended to William Gorges in 1636, and comprising those settlements along the coast of Maine, which had not been included in the Ferdinando Gorges patent of 1631. William Gorges was appointed first deputy-governor of the district.

**New South Shetland Islands**. See SOUTH SHETLAND ISLANDS.

**New South Wales**, Australia, the oldest Australasian colony of Great Britain and since 1901 one of the six original and the most populous, though not the largest, state of the commonwealth, in the southeastern portion of the continent. It is separated from Queensland on the north by an irregular line running southwest from Port Danger in lat. 28° 8' S., till it meets the 29th parallel of latitude which forms the rest of the north boundary; on the east the Pacific Ocean is the boundary; on the south the Murray River, and a line running northwest from Cape Howe, lat. 37° 31' S., separates it from Victoria; while on the west the 141st meridian forms the boundary between the state and South Australia.

The state has an area of 310,700 square miles divided into 141 counties. It is more than twice the size of the State of California and five times the size of England and Wales.

**Topography**.—The surface, more especially in the eastern and most populous portion, is much diversified, and presents, in its general features, a succession of hills and valleys, mountains and plains. The great dividing chain forming the great watershed of the state, with many summits



## NEW SOUTH WALES

varying in height from 3,000 to 6,000 feet, extends from north to south nearly parallel to the coast, at the distance commonly of from 30 to 50 miles inland or sometimes more, and takes in the north the name of Liverpool Range, in the centre that of the Blue Mountains, and in the south that of the Australian Alps. The highest summit is Mount Kosciusko, in the southeast 7,328 feet. The space between the mountains and the sea is partly broken by spurs and ramifications, but descends from the west with more or less rapidity, and has a generally undulating surface, intersected by water-courses; in some places well wooded, and in others covered with dense brush-wood. The coast line presents in general bold perpendicular cliffs of sandstone, in horizontal strata. Occasionally the cliffs are interrupted by low sandy beaches, some of which stretch to a considerable distance inland, and appear to have been covered by the sea at no very remote period. The indentations of the coast are remarkable for their number, and the excellent harbors which they form. Among them are Port Stephens, Port Hunter, Broken Bay, Port Jackson (on which lies Sydney), Botany Bay, Jervis Bay, Sussex Haven, and Two-fold Bay.

*Hydrography.*—The most important rivers are the Murray, which is navigable as far as Albury (lon. 147° E.); the Murrumbidgee and Lachlan, farther north, which after uniting fall into the Murray; and the Darling, which flows from northeast to southwest through the whole extent of the state, and also falls into the Murray. The Darling, in its upper course known as the Barwon, has among its more considerable affluents the Bogan, the Macquarie, the Castlereagh, the Namoi, the Gwydir, the Macintyre, and the Warrego. The Murrumbidgee is 1,350 miles long, the Darling 1,160, the Macquarie 750, the Lachlan 700. Notwithstanding the existence of those large rivers the western plains are but sparsely watered. The comparatively narrow space between the mountains and the Pacific leaves little room for the development of large rivers. Many of them are for a great part of the year either altogether dry, or form a succession of deep ponds or water-holes instead of continuous streams. The chief are the Hunter, 300 miles, which falls into the fine port of that name at Newcastle, and is navigable for 50 miles above its mouth by small craft of 30 to 40 tons; and the Hawkesbury, 330 miles, which falls into Broken Bay, and is navigable by vessels of 100 tons as far as Windsor, a distance of 140 miles. Others are the Shoalhaven, 260 miles; the Clarence, 240 miles, of which 70 are navigable; the Macleay, 190 miles; and the Richmond, 120. Some of these rivers in the winter season cause disastrous floods.

*Geology and Mineral Resources.*—In the southeast, east, and middle the prevailing rocks are Palæozoic (Silurian and other), with granite and other igneous rocks forcing their way to the surface, and in this region are chiefly situated the metalliferous deposits in which New South Wales is so rich. In the east Carboniferous and Permo-Carboniferous rocks also occur extensively, and to these belong the large and valuable coal fields of the country. Valuable sandstones also exist here in abundance. Cre-taceous rocks extend over a wide area in the north and west, and the plains are mostly of Pleistocene origin. In connection with the

granite, limestone, both granular and foliated, occurs in abundance, and besides being often hollowed out into stalactitic caverns, sometimes passes into a beautiful close-grained marble, as white as that of Carrara.

The coal fields extend over an area of 10,000 acres, with more than 91 mines. The state exports considerable quantities of coal to the west coast of North and South America. Copper ore of the richest quality and tin exist in large quantities, and iron is very generally distributed. Gold is found in all parts of the state; the value of the output in 1901 was \$4,606,410, showing a considerable diminution; the total value of the output of gold for fifty years since its discovery in 1851, is \$248,309,075. Most of the gold is sent to the mint for coinage. The combined value of the silver and lead output in the same year was over \$6,500,000. Several varieties of precious stones have been found, notably opals.

*Climate.*—As the area of the state extends over 110 degrees of latitude and contains a good deal of elevated ground, nearly every variety of climate is to be found. In the north the climate is tropical, while on the table-lands severe frost is not uncommon. The interior plains are very dry, and severe droughts occasionally kill millions of sheep, but the coast districts have abundant rains. Though the hot winds of the warm season are annoying, they are not unhealthful, while storms and electrical disturbances are comparatively rare.

*Forestry, etc.*—About one fourth of the area of the state consists of forest lands, which in 1887 were taken under the care of the government by the creation of a Forest Conservation Department. For the Flora and the Fauna of the state, see AUSTRALIA.

*Agriculture and Stockraising.*—The absence of water renders much of the land useless for agricultural purposes, but a large proportion is devoted to pasturage and grazing. In some places artesian wells have been introduced with good results. There is no great breadth of highly fertile land away from the river banks; but the fertility of the land on the margins of rivers is exceptional. Where liable to inundation, however, the year's harvest may be swept away in a few hours. The area under cultivation in 1902 was 2,274,493 acres, and the crops included wheat, maize, barley, oats, rye, millet, potatoes, lucerne and artificial grasses, vines, orange-trees, sugarcane, some tobacco, etc. Dairy husbandry is becoming important, and butter is exported. Native fruits are neither numerous nor valuable, but the best of those of Europe are acclimatized. So well does the peach thrive, for instance, that farmers sometimes feed their pigs with the windfalls of their orchards. Other fruits include oranges, apples, pears, apricots, nectarines, cherries, plums, figs, grapes, melons, mulberries, gooseberries, currants, etc., and in the more-northern parts the banana is abundant. The rearing of silkworms on the mulberry, which might be carried to an almost indefinite extent, has attracted attention. The grapevine is successfully cultivated, as well as the sugarcane; considerable quantities of wine, brandy, and sugar being made. The rearing of sheep (of which there are about 50,000,000 in the state) and cattle are the chief employments of the people.

*Commerce and Industries.*—Wool is the most

## NEW SWEDEN — NEW TESTAMENT CHRONOLOGY

important article of export. The annual value of this export is not without fluctuation, but is again increasing. In 1908 the quantity of wool exported was 338,129,000 pounds, valued at \$65,000,000. Other important exports comprise coal, silver ore, silver lead, gold, and coin, frozen and preserved meat, butter, tallow, leather, wheat, and flour. The principal imports are wearing apparel, sugar, tea, and hardware. The value of the total exports in 1908 was \$204,928,795, of imports \$188,213,730. In 1908 the number of vessels entered and cleared was 6,415, with a tonnage of 12,601,909.

The manufacturing industries are naturally not of much importance as yet, but they are already very varied, and help to supply a considerable share of the home demand. In 1909 there were 3,623 miles of railway open, nearly all constructed by government, which has spent over \$200,000,000 upon the railways; 15,910 miles of telegraph line were in operation.

**Government.**—The constitution of New Wales vests the legislative power in a parliament of two houses, namely the Legislative Council and the Legislative Assembly. The former consists of 21 members nominated by the crown, originally for the term of five years, but, subject to certain conditions, for life at the expiration of that period; and the latter of 125 members chosen by the same number of constituencies. Members of the Assembly receive £300 per annum, and they are entitled to travel free by rail or tram in the state. As electors require no property qualification there is virtually universal suffrage. The executive consists of a governor nominated by the crown, assisted by a council composed of state secretary, state treasurer, the ministers for lands, public works, mines and agriculture, education, and justice, the postmaster-general, and the attorney-general. The parliaments last for three years. Unless local acts supersede them the imperial laws are enforced. No enactment of the state legislature becomes law till sanctioned by the governor, and in some cases by the sovereign. The state sends 6 representatives to the federal senate, and 26 to the federal house of representatives. The state has taken measures for its own defense, and has a force, partly paid, partly volunteer, numbering more than 6,000, and including infantry, cavalry, artillery, engineers, naval brigade, etc.

**Population.**—On 31 March 1908 the population was 1,580,968, of whom 844,549 were males and 736,419 females, chiefly British-born subjects. The aborigines numbered about 5,000 and the Chinese 11,000. Sydney is the capital, and other urban centres are Broken Hill, Newcastle, Parramatta, Goulburn, Maitland and Bathurst. Pop. (1910 est.) 1,700,000.

**Religion and Education.**—There is no established religion. Among the religious sects the Church of England, Roman Catholics, Wesleyan and other Methodists, and Presbyterians hold the chief place. Education has been since 1880 controlled by a minister of public instruction. The public schools are classified as public primary schools, superior public schools in the chief centres of population, evening schools, high schools for boys, and high schools for girls. Primary education is compulsory, but not free, unless in cases where parents are unable to pay fees. Among the higher educational institutions are the Sydney Grammar

School, and St. Paul's, St. John's and St. Andrew's colleges, and the Women's College, the colleges being all connected with the University of Sydney—an important institution, attended by between 600 and 700 students, and granting degrees in arts, medicine, science, and law. Technical education is administered by a special branch of the department of public instruction.

**History.**—New South Wales was discovered by Captain Cook in 1770, and founded as a penal settlement (at Botany Bay) in 1788, the convicts being employed in road-making and preparing the soil for agriculture. One of its early governors was the notorious Captain Bligh, who was deposed by the colonists in 1808. The most important events in its history since convict immigration ceased in 1840 are the establishment of representative institutions in 1843; the erection of Victoria into a separate colony in 1850; the discovery in May 1851 of extensive gold tracts; the rush to the diggings, with consequent great increase in population and prosperity; and the incorporation of the colony in the Australian commonwealth in 1901. The first railway, from Sydney to Parramatta, was opened in 1855. Among more recent events are the Sydney Exhibition held in 1879, and the Intercolonial Conference held at Sydney in 1883. The colony celebrated its centenary in January 1888, and a special series of stamps of elaborate design was issued in commemoration of the event. On 1 Jan. 1901 Sydney was the scene of the inauguration of the first governor-general of the new commonwealth, Lord Hopetoun. (See AUSTRALIA; AUSTRALIAN FEDERATION.) Consult: Griffin, 'New South Wales, Her Commerce and Resources' (1888); Hutchinson, 'New South Wales; the Mother Colony of the Australias' (1896).

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**New Sweden, or New Swedeland,** a name given in the 17th century to land lying between the Dutch colony of New Netherlands and the English colony of Virginia. It included territory in what is now Delaware and New Jersey. It was settled in 1638 by a colony from Sweden; and in 1655 it was taken possession of by the Dutch.

**New Testament.** See BIBLE.

**New Testament Chronology,** the chronology of the events related in the four Gospels, and the Acts of the Apostles, together with the dates of the Apostolic epistles. It may be outlined as follows:

**The Birth of Jesus Christ.**—According to the First Gospel Christ was born in the days of Herod the Great, whose death, as shown by concurrent testimony, took place 750 A.U.C. Josephus (Ant. XVII. viii. 1) tells us that this event occurred 37 years after he had been raised to the throne by the Romans 714 A.U.C. This would be 40 years before the Christian era as calculated by Dionysius Exiguus (533), who placed the birth of Christ in the year 754 A.U.C. Herod, therefore, died 750 A.U.C. Josephus says this event took place a little before the Passover, that is, in the spring of 750. The Nativity must be placed before this, and far enough before it to admit of time sufficient being allowed for the presentation in the temple, the visit of the Magi,

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and the flight into and sojourn in Egypt, during which last period the death of Herod took place. It cannot then be placed later than the autumn of 749 A.U.C. (5-4 B.C.). The day and the month on which the whole Christian Church celebrates the event was fixed in the time of Chrysostom (about 386 A.D.) and has been retained ever since among both Eastern and Western Christians. There is no historic or scientific basis for the assignment. Some have held that as 25 December follows the winter solstice and is a period of the year at which the sun is rising day by day higher in the heavens with the new promise of spring, it was chosen arbitrarily, but fancifully, as a suitable time for celebrating the dawn of an era which brought fresh life to the human race. Others, with more reason, aver that as the Saturnalia extended in old Roman times from 17 December to 23 December, so the Christian festival was chosen at a date at which it may be thought suggestively to replace a pagan holiday during which slaves were for a few days free, sat at their masters' tables, and were served by them. Perhaps the Latin festival of the Brumalia, the feast "Invicti Solis" (of the "Invincible Sun") was intended to be superseded by the Christian festival of the "Sun of Righteousness." It may be observed in passing that as the supposed day of the Nativity would have occurred during the rainy season in Palestine it is extremely unlikely that shepherds would then have been watching their flocks by night in the open air.

*Synchronistic Roman History.*—(1) Saint Luke says that the census which took Joseph and Mary to Bethlehem took place while Quirinus (Cyrenius) was legate of Syria (Luke ii. 2). This legate, history tells us, was appointed to carry out the census 10 years later, 6 A.D. This had been made much of by Strauss and others, but Dr. A. W. Zumpt (see ZUMPT, AUGUST W.), the famous German philologist, in his tractate, 'Das Geburtsjahr Christi' (1869), has shown that Quirinus was twice governor of Syria, for the second time 753 A.U.C. (2) Another difficulty has been found in Saint Luke's date of Saint John Baptist's mission, which he says (Luke iii. 1) began in the 15th year of the reign of Tiberius. Tiberius did not become sole emperor until 14 A.D., but he began his reign as associate emperor with Augustus 12 A.D. (765 A.U.C.) which gives 780 A.U.C. or 27 A.D. for the date of the Baptist's ministry, when he would be in his 30th year, as was Jesus Christ (Luke iii. 23) and not 28 as if calculating from the sole reign of Tiberius. (3) The restoration of the temple by Herod the Great began 18 B.C. (John ii. 20). Forty-six years after that would be 27 or 28 A.D., which would be the commencement of our Lord's ministry in Galilee. The completion of the temple to its full magnificence was not accomplished until the day of Herod Agrippa II., 64 A.D. (Compare Josephus, 'Antiquities of the Jews,' XV. xi. 1). (4) The death of Herod I. (Acts xii. 23) occurred 44 A.D. (5) According to Tacitus, 'Annales,' xii. 52, and Suetonius, 'Claudius,' the Jews were expelled from Rome (Acts xviii. 2) by the emperor Claudius 52 A.D. (6) Festus (Porcius Festus), Acts xxv. 1, was appointed procurator of Judæa 60 A.D. (7) The persecution of Nero in which Saint Paul was put to death began 64 A.D. in the 10th year of that em-

peror's reign, while Gessius Florus was procurator of Judæa.

*From the Birth of Christ to the Fall of Jerusalem.*—At the time of Christ's birth C. Sentius Saturninus had been succeeded as legate of Syria by P. Quintilius Varus with whom, according to Dr. A. W. Zumpt, P. Sulpicius Quirinus was associated (Luke ii. 2). Judæa was made an imperial province under Augustus himself, who governed it by procurators, or stewards, on the deposition of Archelaus, 6 A.D. Herod Antipas continued to reign as vassal king of Galilee and Peræa, while Cyrenius (Publius Sulpicius Quirinus) carried out the census; enrolment of the population, or "taxing" (Luke ii. 2). Coponius appears to have been the first procurator and was followed, 9 A.D., by Marcus Ambivius. The appointment of Tiberius as colleague to Augustus at Rome in 12 A.D., corroborates the computation of years in Luke iii. 1. Annus Rufus was procurator in 13 A.D. and Valerius Gratus in 14 A.D. Tiberius was made sole emperor in the same year. Caiaphas was made high priest in 25 A.D., and Pontius Pilate appointed by Tiberius his procurator in Judæa 26 A.D. The last Passover of Christ, his Crucifixion, Resurrection and Ascension occurred in the early spring of 30 A.D., and the day of Pentecost on 26 May of the same year. The martyrdom of Stephen and the conversion of Saint Paul happened two or three years later, and Paul's first visit to Jerusalem took place 35 A.D. Caligula was emperor in succession to Tiberius in 37. He in turn was succeeded by Claudius in 41 A.D., the same year that Herod Agrippa was made king of Judæa and Samaria. Saul was introduced to the Christians at Antioch in 43 A.D. and Herod died in 44; in that year Cuspius Fadus was appointed by the emperor Claudius to be his procurator in Judæa. It was 45-46 A.D. that the famine raged at Jerusalem and Paul and Barnabas visited the brethren there with relief. Tiberius Alexander was procurator when the famine reached its height in 46 A.D. In 47 A.D. Paul and Barnabas made their first missionary journey together, and returned in the autumn of 49 to go to Antioch. The Council of Jerusalem took place the same year. In 50 A.D. Paul set out with Silas on his second missionary journey, in which year Claudius uttered his decree of banishment against all the Jews, sorcerers and magicians in Rome. In 51-52 A.D. Saint Paul visited Athens and Corinth, and from the latter city wrote his first and second epistles to the Thessalonians. He left Corinth early in 53 A.D. and arrived at Jerusalem in March, whence he proceeded to Antioch and wrote his epistle to the Galatians. Thence in the same year he started on his third missionary journey which ended at Ephesus, where he spent three years, 53-56 A.D. Nero succeeded to the purple in 54; the first epistle to the Corinthians was despatched 55, and in 56 Saint Paul left Ephesus and visited Macedonia and Corinth. From Macedonia he wrote his second epistle to the Corinthians, 56 A.D., and from Corinth his epistle to the Romans 57 A.D., after which he left Corinth for Jerusalem, where he was arrested in the temple and brought before the procurator Porcius Festus. He was taken to Cæsarea 57-59, appealed to Cæsar, as a Roman citizen, and was sent to Rome, 59 A.D. He was shipwrecked at Malta,

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but reached Rome in March 60. While in prison (61-62 A.D.) he wrote his epistles to the Colossians, the Ephesians, the Philippians and Philemon. He was tried and acquitted early in the year 62 A.D., and made a missionary journey in Macedonia, Asia Minor, Crete, and most probably Spain (63-66 A.D.). In the meantime he wrote his first epistle to Timothy and his epistle to Titus. He wintered at Nicopolis and in the spring of 66 A.D. was sent to Rome and underwent a second trial 67 A.D., wrote a second epistle to Timothy and was put to death by the sword in the last year of Nero's reign, in the 68th year of his age, and the 35th of his conversion. The first persecution of the Christians took place under Nero, who was succeeded by Galba 68 A.D. Under Vespasian, who took the purple 68 A.D., the Romans made war on the Jews under the leadership of Titus, son of and eventually successor to Vespasian, and the destruction of Jerusalem took place 70 A.D. Consult: Lewin, 'Fasti Sacri' (1865); Ramsay, 'Saint Paul the Traveler and Roman Citizen' (1896); Ideler, 'Handbuch der Mathematischen und Technischen Chronologie' (1825); Wieseler, 'Chronologische Synopse der vier Evangelien' (1843; English translation, London 1878); 'Chronologie des apostolischen Zeitalters' (1848).

**New Testament Criticism, Status and Drift of.** If the importance of a writing be estimated by the influence it exerts and has exerted on the mind of men and on the history of the human (more particularly the Caucasian) race, *Homo Europæus*, and there seems to be no other standard nearly so just, then it must be admitted that the New Testament writings so far transcend all others as to form a class of their own. This affirmation need not be argued; it is undisputed. Hence it becomes a matter of supreme interest to understand these writings, from which modern no less than mediæval history takes its start, its form, its color, and, in great measure, its inspiration. But no understanding is final or satisfactory that is not historical. The question of Zoölogy is not, "What use have cattle for their horns?" but rather, "How did cattle get their horns?" So, too, the primary query with the critic is not, "What does the New Testament teach?" (this question is left to the divine and the theologian), but How did these Scriptures come into being? Who wrote them? When? Where? Under what circumstances? And for what ends? The whole body of knowledge thus far attained, and, still more, the whole body of investigation touching these inquiries are comprehended under the title of New Testament Criticism. This latter has therefore, in first line, nothing to do with questions as to the truth or falsity of any teaching of the Scriptures, nor with any matters of doctrinal or dogmatic interpretation, except in so far as these latter may be bound up with the conclusions concerning the genesis of the Scriptures themselves. This criticism, then, is essentially a discussion of origins, and not of values. However, it need not be disguised that doctrinal values, or at least estimates, may often be seriously affected by our determination of origins. In case of some scientific verity or method, as of the Pythagorean theorem or the use of zero in numerical notation, it may be quite indiffer-

ent whether the source be found in Greece or in Egypt, in Babylon or in Japan; but in case of some article of faith, some doctrine regulative of life but beyond the reach of proof or disproof by experiment or by argument, it is by no means indifferent whether it be the dictum of some supramundane personality or some theosopheme of a sect of mystics, the utterance of an inspired Apostle or the refinement of some ancient Babylonian myth. The interest of New Testament Criticism is not then merely academic; it does not appeal solely to the cognitive faculties, to the civilization-making instinct for knowledge as knowledge: its secondary and derivative but hardly less important interests concern our active natures as well and bear upon the whole front of our practical and institutional life.

The first inquiry that meets the student of any document concerns the text itself. Is this latter an original, or is it a copy? Or perhaps the copy of a copy? In either case, has it suffered any corruption, or is it a faithful transcript? In case there be many discrepant copies — the case actually presented — there will arise many questions as to the comparative age and authenticity of these copies, as to their relations to each other, and it will perhaps be necessary to reconstruct the supposed original from the contradictory attestations of these witnesses. Such is, in general, the text problem of New Testament Criticism, one of the most highly complex that ever challenged the efforts of the human understanding.

The testimony, which is enormous in amount, exists in the form of manuscripts, both uncials and cursives, in the supposedly original tongue (the Greek), of translations, as Latin, Syriac, Æthiopic, Armenian, Gothic, of citations by the early Christian writers, of lectionaries arranged for liturgical use, of capitulations and versifications or divisions into chapters and verses, and so on. The problem of sifting and evaluating such a mass of evidence and striking the golden mean of truth would seem too difficult for human intellect, especially as there is no secure foothold at any point, nor any sure way of testing our results as we proceed. In the end there is no court of final appeal, and the whole case must be left undecided. Under such circumstances the marvel would seem to be that there should be any agreement at all, that there should not be as many minds as critics.<sup>1</sup> However, extremely numerous as are the points of diverse judgment, where adjudication seems hopeless, the number of agreements is still far greater, where critical opinions rest harmoniously and undisturbed. Now it might be thought that this harmony would be extended and perfected by the discovery of new testimony, which of late years has proceeded apace, and by the deeper and minuter study of the long familiar evidence. But the fact is exactly the reverse. Accumulation of depositions and profounder investigations have confirmed some critical judgments, but have shaken many others and completely overthrown not a few. The problem is indeed becoming not less but more complicated with advancing knowledge, and the textual uncertainty was never before so great as it is now.

<sup>1</sup> So Jerome's aphorism: *tot enim sunt exemplaria pene quot codices*, in his Preface to the Gospels, addressed to Pope Damasus.

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True it is that the last generation has witnessed the most brilliant attempts<sup>1</sup> yet made to construct the most highly probable text. Those masterly scholars, Bishop Westcott and Dr. Hort, thought they might, by a careful study of the genealogy of the various witnesses, attach a coefficient of value to each one singly and in combination, and thereby determine the original text in the overwhelming majority of cases with a close approach to certainty. Plausible and seductive as was their argumentation, and thoroughly accepted even now in many high quarters, it was yet fatally defective at many points and for several reasons, and can no longer command scientific assent. The "neutral" text which they posited, as best represented by the great Vatican MS. B, is a figment of the imagination. The deference paid to certain great uncials was unwarranted. The testimony of the Fathers and the versions was undervalued. The depreciation of the so-called Western text was undeserved. The rash assumption that F was a copy of G was unfortunate.<sup>2</sup> Closer study has shown decisively that at crucial points the witnesses upon which Westcott and Hort relied most confidently might all be misleading, and the MSS. most lightly esteemed might present the older reading. Even as the shepherd boy of old laid low the giant, so at any time may some neglected cursive or version or citation by the Fathers overthrow the most venerated uncial. Thus, the all-important word *Ρωμη*, in Rom. i. 7, 15, is attested by nearly all the best authorities; none the less it is an interpolation (Smith, J B L 1901, Part I., p. 3 ff., Harnack, 'Preuschen's Zeitschrift' 1902, I., p. 83 f.). So, too, the position of the *Doxology* at the end of Rom. xvi. is witnessed by \* B C D and the best versions; nevertheless the position at the end of xiv. is certainly the older. The Epilogue (xiv. and xvi.) is given by nearly every authority, but, in spite of all, it is proved to be a later addendum; the Amiatinian and Fuldensian capitulations clearly point to its earlier absence.<sup>3</sup>

These examples also correct very usefully a prevalent notion that textual variations are after all merely trifles, like the fading line between Imperfect and Aorist or the impalpable refinements of Greek syntax. On the contrary, they are sometimes blinding in their illumination, in their revelation of the primitive structure of our Scriptures.

Thus, the textual facts just stated involve a complete reconstruction of our notions about *Romans*, which now seems to be no Epistle and not addressed originally to Romans, but to be a compilation of moral and theological essays, first addressed to "all those in love of God," afterwards fitted out with Prologue and Epilogue as it now stands.

So, too, the extremely important F and G variant in Rom. ix. 22, unnoticed even by the best commentators (as Godet, Sanday, Weiss, Lipsius, Hofmann), indicates clearly the pure Judaic original of this famous chapter; the Christian hand has been laid on lightly and deftly but transfigures into a cosmic theory

what was at first only a Jewish patriot's explanation of the delay of divine vengeance upon "vessels of wrath," the Pagan oppressors of his people—an observation more fatal to theological libraries than the torch of Omar. See 'The Hibbert Journal,' 1, 2, pp. 328, 329.

Still another notion must be corrected. Let no one imagine that all or nearly all the variants are mistakes or due to mistakes; very many are visibly intentional. It was the ancient habit, particularly of the Oriental, to compile and re-compile, to edit and re-edit and re-edit again, and with sacred books this habit became almost an inviolable rule. No one disputes this fact in case of the Old Testament and the Apocrypha and the extra-canonical early Christian writings. It would be well-nigh miraculous, if the New Testament Scriptures should offer exceptions. Before the establishment of the Canon no sacred awe invested the canonicity, there was no apparent reason why the favorite Scriptures should not be systematically modified to keep pace with the developing Christian consciousness, very much as our creeds are altered nowadays.<sup>4</sup>

It is notorious that the Old Catholic heresy-hunters charged upon their opponents, Marcion, Valentinus, and the rest, that these latter had corrupted the Scriptures to suit their own heresies. The charge may often have been well-founded in the sense above defined, but it might undoubtedly have been retorted and was retorted with equal justice by the heretics upon the Orthodox. The great master, Hort, has himself said, in speaking of the "Doxology": "Indeed, 'copies corrupted by Marcion' need mean to us no more than 'copies agreeing in a certain reading with Marcion's copy.' . . . On the whole, it is reasonably certain that the omission is his only as having been transmitted by him, in other words, that it is a genuine ancient reading." Wetstein's great word holds good: "Various readings, almost all, are due to the zeal, ingenuity, and guesswork of transcribers." Tischendorf admits: "It can not be doubted that in the very earliest days of Christianity there were multifarious departures from the pure Scripture of the Apostles, wherein to be sure there entered naught of dishonesty or guile." Under the deeper probing of Von Soden and others the original "neutral" B-text of W.-H. turns out to be only a very learned revision; the fault of the great Vatican is that it has considered too curiously.<sup>5</sup> It is impossible to blink the fact that all MSS. of all parts of the New Testament abound in readings that are plainly second thoughts. Our most ancient and revered codices reproduce only deformed, transformed, and highly elaborated originals. It is extremely noteworthy that the heretical readings are slowly coming to their rights, to be recognized as often more primitive, less subtly reflective forms. Thus in John i. 3 the Gnostics read: "And without him was made not one (thing). What was made in him was life," putting the full stop after *ἐν*, instead of after *γέγονεν* (was made); and their punctuation is at

<sup>1</sup> In the same spirit King James' Translators, in their 'Address to the Reader,' wrote wisely and well.

<sup>2</sup> As Holsten was led to observe—Holsten, the Doctor subtilissimus of Protestantism, the matchless master of exegesis, whose imposing reconstructions of Paulinism, by their very perfection, constitute the *reductio ad absurdum* of the premises and methods he employs.

<sup>3</sup> As by Tischendorf, Westcott and Hort, Weiss, von Soden.

<sup>4</sup> Smith, 'The Pauline MSS. F and G,' Am. Jour. of Theol., July and October 1901.

<sup>5</sup> Smith, 'Unto Romans,' J B L, Vol. XXI., 1902, Part II., pp. 117-169.

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last adopted by W.-H. In a word, it can no longer be doubted that Scripture was made from Dogma, not Dogma from Scripture.<sup>1</sup>

There is little reason then to hope for the establishment of a Received Text—the *ignis fatuus* of textual criticism, though not to despair of it be the last infirmity of noble minds. If such did not exist in the beginning, neither will it exist in the end. The discovery of new manuscripts, the collation of a few hundred more, will not bring the chaos to order but will make confusion worse confounded. Witness the publication of the Sinaitic Palimpsest in Syriac and the turning of attention to the famous Beza Codex, called D: they have merely raised new problems, not settled the old. It is perfectly just, then, and highly significant when Blass no longer quotes critical editions of the New Testament, but quotes the MSS. themselves, never presuming to say what is the "true text." Such in theory at least is the position to which criticism must finally come. The critic's text, no matter how ingeniously or plausibly "berichtigt," is only the critic's text, not the "true text," after all.

And is such a mouse-like conclusion the only issue of the mountainous labors of centuries? Shall we know from year to year less and less what was the original autographic legacy, "the pure Scripture of the Apostles"? True. But this "less" is yet in a higher sense infinitely more. For we now come to recognize clearly the prime error of our assumptions thus far, and immeasurable is the progress involved in this recognition. It has, in fact, been everywhere and everywhen tacitly assumed that there *was* in each case a unique autographic original, and that the problem of textual criticism was to discover that autograph, restore that original, and explain the manifold deviations therefrom. It is no reproach to criticism to have made this assumption and upheld it for centuries. No other was so natural or so plausible; none the less, it has proved unsatisfactory. In the face of the widening and multiplying diversities of the text-tradition, we can no longer range the Gospels and Epistles side by side with the Greek histories and the Letters of Cicero and ask how did Luke or Paul write it, just as we ask how did Thucydides or Plutarch or Pliny phrase it? In the Greek and Latin classics we recognize the works of the individual consciousness, here and there marred or corrupted, but each, in the main, single, solitary, self-consistent. Not so in the New Testament Scriptures. There we are confronted less with an individual than with a collective and communal consciousness. This consciousness is not always the same. By no means. It varies widely from the Synoptics to the Johannines, from the Paulines through the Catholics, to the Apocalypse. But it is nowhere individual, nowhere unital, nowhere self-consistent;<sup>2</sup> it is everywhere communal, everywhere complicate, everywhere harmonistic. Indeed, Syncretism is by all odds the most con-

spicuous and impressive phenomenon it presents, a syncretism without a parallel in literature, unless in the Old Testament. In the latter the attempt has been made bravely and instructively, even if prematurely, to separate the components, to disentangle the "manifold wisdom" and distinguish the threads by colors. The time is not yet ripe for such an essay in the New Testament, but we may be sure that more than the seven primaries will be needed. The widely varying testimony of the MSS. greatly complicates the problem, while lending some aid in its solution. Perhaps it may be well to illustrate the state of the case by a few examples. Let us pass by the long familiar facts of the omission or varying position of the paragraph anent the Adulteress (John vii. 53—viii. 11), of the absence of the conclusion of Mark (xvi. 9—20), and many others, and fasten our eyes on the more massive fact that the variations in Acts are so extraordinary and omnipresent that the great master, Friedrich Blass, has been driven to the assumption of two originals, an  $\alpha$ -text and a  $\beta$ -text. The remarkable peculiarities of the Beza Codex (D) had been noted by F. A. Borneman as early as 1848, but critics did not follow him in regarding it as presenting the older text; its eccentricities were ascribed to the copyist, who, like the villain in the play, was thought capable of anything. Tischendorf, Westcott-Hort, and Weiss base their texts of Acts essentially on B. A C. It remained for Blass to show that this D was only one of many witnesses to a distinct Occidental text very widely ramified. It was as when one tugs mightily at some exposed root of a tree: the earth begins to stir everywhere on that side of the tree. Blass was led to think that two MSS. proceeded originally from Luke, one a memorandum (or draft) which he himself filled out into a book (the  $\alpha$ -text or Antiochian form) for Theophilus. The draft, he thinks, remained as the  $\beta$ -text, at Rome, where it was elaborated into the Occidental text (*forma romana*). This theory of Blass has not maintained itself; it is naive at many points, and it wrecks on many textual and other facts; but it has proved extremely valuable as bringing clearly to light the systematic differences of the MSS. and showing how a critic with ultra-conservative leanings (Blass dates Acts from 57-59 A.D.) is yet forced to the assumption of two primitive texts. Let one citation indicate the interval between them.

Acts xxvii. 1 ( $\alpha$ -text): "And as it was determined for us to sail unto Italy, they were delivering both Paul and some other prisoners to a centurion by name Julius, of the Cohort Augustan."

( $\beta$ -text):

"So therefore the governor decided for him to be sent to Cæsar, and on the morrow, having summoned a certain centurion of the Cohort Augustan, by name Julius, he delivered to him Paul with the remaining prisoners."

It remains to add that Blass has found it necessary to distinguish two texts,  $\alpha$  and  $\beta$ , in Luke's Gospel as well as in Acts.

The criticism of this eminent philologist, though not attaining quite the goal proposed, may be said to mark the beginning of the end of well-meant efforts to reconstruct the unital autographic originals of the New Testament

<sup>1</sup> It is indeed plain on its face that a doctrine must in general antedate its literary expression, and when we find this expression in a highly composite, apophthegmatic form, we may be sure it has been forged on the common anvil beneath the alternate strokes of more than one hammer.

<sup>2</sup> Unless, perhaps, in the unicapitulars, as Philemon, Jude, 3 John.



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Scriptures. The notably complex character of these latter comes out daily more and more clearly. The Baurian criticism had left the Apocalypse and the four chief Paulines as the primary and irresoluble literary records of the Apostolic Age, by which all others were to be measured and appraised. Of this sacred pentagram it was the analysis of Völter and Vischer that dissolved the first corner. These critics, especially the latter, have exhibited the Apocalypse as primarily a Judaic composition, itself highly composite, which has been overworked and christianized by one or more Christian hands. The still deeper digging of Gunkel, Bousset, Zimmern, and Jeremias has brought to light a considerable amount of exceedingly primitive, even Babylonian, mythical material, which had been cast into the alembic of the Apocalypstist. On the other hand, the extremely complex character of Romans has come clearly into evidence. Spitta has found it necessary to break it up into two Epistles; the great Lightfoot, while rejecting the crude attempt of Renan, found himself constrained to propound a theory of a Shorter Recension. Völter surrendered the unity unconditionally, and Van Manen the Paulinity in his elaborate work on *Paulus*, though he had defended it against Loman. Steck also in his widely read and very readable *Galaterbrief*. More piercing was the analysis of Piereson and Naber in their remarkable *Verisimilia*, which in spirit and principle is the most advanced of European critical productions. Independently of the foregoing, and following other methods, the present writer has exposed the concretionary structure of Romans in a series of monographs, with sufficient clearness. It can hardly be doubted that similar results await the application of similar methods to Corinthians and Galatians. Indeed it was said years ago in the *Theol. Jahresb.*, "The 2 Cor. Letter will no longer hold together."

In Romans the presence of a large body of ancient Judaic originals seems now made out. The conservative J. Rendel Harris perceives that the list of sins (Rom. i. 29-32) is based upon an ancient Jewish Vidui (Confession for the day of Atonement).<sup>1</sup> The same must, of course, be said of the similar list in 2 Tim. iii. 2-5. The searching analysis of Spitta and Masseebau shows clearly that the Epistle of James is almost wholly Judaic, christianized by a few insignificant interpolations.

The problem of discovering the original elements, often Jewish, of the New Testament compositions, has been propounded only recently and has not yet advanced far towards solution. But the progress already made is most encouraging. That way lies truth—of this the day for doubt seems gone forever.

Closely connected with this quest is another, for the *sources* of the Scripture quotations attributed to the Gnostics by the Fathers. Thus far it has been held unsuspectingly that the Gnostics quoted from our Canonics or from parallel, still later sources. Inasmuch as the matter is of fundamental importance, it has appeared well to the writer to subject it to a minute and exhaustive investigation, which should include primarily Hippolytus, Irenæus, Tertullian, and Clement of Alexandria. As a re-

sult of this investigation, though not yet completed, it may be declared that no evidence has yet come to light that the Gnostics ever used our Canonics; on the contrary, it appears certain that the Gnostics derived largely from sources now lost but certainly presenting much of our present canonic matter in a cruder, more primitive, less elaborate form. By every token these sources contained this matter in far more natural connection than it appears in at present. The new light that is thus thrown upon the anharmonies and asyndeta of the New Testament is often surprising. The transformations are often complete and effected in queerly ingenious manner. We now begin to feel the force of the oracle in Matt. xiii. 52: "Every scribe disciplined for the kingdom of the heavens is like unto a householder that brings forth from his treasure things new and *things old*." A few examples must here suffice. In Matt. xiii. 3-9, Mark iv. 3-9, Luke viii. 5-8, we read the Parable of the Sower. In Matt. xiii. 19-23, Mc. iv. 14-20, Luke viii. 11-15, it is carefully expounded. The seed is declared to be "the Logos of God," the Sower is not interpreted, but is left to be understood of the Jesus or indeed of any preacher of the Gospel. Critics, even the keenest, as Koetsveld, Jülicher, Bugge, have never yet been able to satisfy even themselves concerning the interpretation, still less concerning the expressed design of the parables, to blind the hearers. Jülicher declares this latter to be impossible, especially for Jesus, and puts the dilemma sharply: "Either the Evangelists or Jesus." No solution is found in the New Testament, but on turning to Hippolytus (*Philosophumena*, v. 8) we find given as a "saying" of the oldest pre-Christian Gnostics, the Naassenes, the following *Allegory of Creation*: "Forth went the Sower for to sow: And some fell by the wayside and were trodden down; and some upon the stony places and sprang up (he says), and through not having depth were withered and died; and some fell (he says) upon the earth the fair and good and made fruit; some a hundred and some sixty and some thirty. Who hath ears to hear, let him hear." . . . Here the Sower is none other than God himself; the seed is the Logos, the *spermatic Logos*, the seminal Reason of the Stoics; the three classes are the elsewhere familiar Choics, Psychics, Pneumatics (all known to the New Testament), otherwise named the Captives, the Called, the Chosen. (A paper read by the writer before the Society of Biblical Literature and Exegesis, New York 28 Dec. 1904.)

In the Gospels the phraseology has been expanded and enlivened, the Hebraism "in his sowing" (*ἐν τῷ σπείρειν αὐτοῦ*) has intruded itself from the Lucan source, a 4th class has been inserted in the 3d (by Justin in the 2d) place, and the application made is entirely new.

In Matt. vii. 13, 14, we read the famous exhortation as to the gates: "Enter ye in by the narrow gate: for wide (is the gate), and broad is the way, that leadeth to destruction, and many be they that enter in thereby. For [how] narrow is the gate, and straitened the way, that leadeth unto life, and few be they that find it." The passage is quite unconnected with its context; there is never any hint as to interpretation; it is a mystery even to Zahn; it is impossi-

<sup>1</sup> *The Teaching of the Apostles*, pp. 83-7.

ble in its present setting. But in Hippolytus (op. cit., v. 8) we find the Eleusinian doctrine of the two gates: the one into the lower common life of flesh and soul, through which all enter at birth, the other into the higher life of spirit, through which only the initiates may fare; then is given as a saying of "the Saviour" the following: "Concerning these (he says) expressly hath spoken the Saviour, that narrow and straitened is the way that leadeth into life, and few are they that fare in into it; broad though and wide the way that leads unto destruction, and many are they that fare through through it." The doctrine of the "Two Ways" was a favorite of antiquity, but no nobler interpretation than this has yet been found. It must not be supposed that the use of the term "The Saviour" (ὁ Σωτήρ) presupposes the Gospel or Christianity. The term is not a New Testament favorite, occurring (save in Luke i. 47, ii. 11, Acts v. 31, xiii. 23) only in the so-called later Scriptures (19 times, 6 times in Titus); it has been shut out, then, from the Gospel tradition, perhaps as a current heathen designation of gods or even kings. With the Gnostics it was greatly preferred, while the Fathers substitute for it the name Lord *Kóπος*, *Dominus*. Its Greek use goes back at least to Æschylus and Pindar, and in its technical sense it was pre-Christian. The battle-cry of the Greeks at Cunaxa was "Zeus Σωτήρ καὶ Νίκη" (Xen. Anab. I., 8, 16).

Again, the doctrine of judging the tree by its fruits finds large space in the Gospels. Thus Matt. vii. 16, "Do they gather grapes from thorns or figs from thistles?" and Luke vi. 44, "For of thorns they gather not figs, nor of bramble harvest grapes." Here is an excellent answer to the oft-recurring question, which of two or more forms is the original? Plainly, both—and neither. They are variants upon an aphorism repeatedly met with in the classics. Says Plutarch, "We do not expect the vine to bear figs nor the olive clusters." *Τὴν ἀμπελον οὐκα φέρειν οὐδ' αἰὼμεν οὐδὲ τὴν ἐλαίαν βότρυς*. 'De Tranquillitate Animi,' XIII. (472, F). Ovid, too, 'De Arte Amandi,' I., 747.

*Siquis idem sperat, jacturas poma myricas  
Speret, et in medio flumine mella petat.*

"If any hopes this, let him hope tamarisks will bear apples, and let him search for honey in the river's mid."

These classic parallels suggest the important question: How much of the New Testament exists under other form in profane literature? The question has not yet received complete answer, which could hardly fail to prove very illuminative.

From all of the foregoing it appears that we must not judge the New Testament by the same standards we apply to the products of individual genius. It is the life of ages and of whole peoples that is concentrated in that volume. It is the gradual precipitate of the moral, religious, and philosophic consciousness of three and a half centuries—a time and two times and the dividing of a time—that is stratified in that wonderful book. To this slow deposit nearly the whole circum-mediterranean region would seem to have made contribution. Certain it is that Rome and Athens and Ephesus and Antioch and Alexandria will bear honorable men-

tion by the side of Palestine and Jerusalem, not yet to include Persia and India.<sup>1</sup> It is the mighty Mother, it is Universal Humanity, that has brought forth this prodigious birth through the long travail of a third of a millennium.

The new aspect under which the critical problem now appears, effects a remarkable transvaluation of values. The great critical movement may be said to have begun, ineffectually to be sure, in the great year 1792 with *The Dissonance of the four generally received Evangelists, and the evidence of their respective authenticity examined*. By Edward Evanson, A.M.—Ipswich. Evanson was bold enough to reject Matthew, Mark, and John, along with many of the Epistles, for reasons never sound but not always unworthy of serious attention. Of course, he held the spurious Scriptures to be later in origin. In 1820 'Probabilia de Evangelii et Epistolarum Joannis, Apostoli, indole et origine eruditorum judiciis modeste subjecit Carolus Theoph. Bretschneider.' The author concludes at the end of 224 well-reasoned pages that the fourth Evangelist was "certainly neither John the Apostle, nor a companion of Jesus, nor a Christian sprung from Palestine and living there, nor a born Jew, but some other Christian skilled in Alexandrine doctrine, a presbyter (as he himself professes in later epistles), who in writing it (exarando) made use of both tradition and a written book. Most probably he lived in Egypt

"The author, who so modestly submitted this book to the judgment of the learned; afterwards still more timidly recanted; nevertheless it brought "eternal honor to his name." His arguments were repeatedly answered in detail, hardly in their entirety. But before and beside these two negative judgments as to the sources, there had spread itself an all-embracing skepticism anent the miraculous contents of the New Testament story. In the hands of the English Deists it took the form of mere mockery, of contemptuous denial or disproof, with little or no attempt to understand them genetically, and beyond this stage it has in many cases not advanced even to this day. But the tenderer, more sympathetic, German spirit sought earnestly to interpret the miraculous narratives, to show how they arose, to make clear what forms of religious consciousness had produced them. In this striving there was a possible basis for a steadily progressive intelligent critique and ultimate understanding of the New Testament, while in the brutal English negation there was none.

This German Rationalism had not gone to such alarming lengths without deadly violence no less to the spirit than to the letter of the sacred narratives, but it had been so insidious as to have remained almost unconscious of itself. It was Strauss who in his 'Leben Jesu kritisch untersucht' (1835) rather roughly tore away the mask and showed the "very Age and Bodie of the Time, his forme and pressure." But the

<sup>1</sup> For Persia the monumental work of Cumont is fundamental and exhaustive. Leaving aside the surmises and parallels of Seydel and Hopkins ("Christ in India," in his 'India Old and New,' 1901), compare the circumspect dissertation of Van den Bergh van Eysinga, 'Indische invloeden op oude Christelijke verhalen' (1901), and articles by Oldenberg in the *Theologische Literaturzeitung* and the *Deutsche Rundschau*. See Edmunds' "Buddhist and Christian Gospels" (1905).

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criticism of Strauss touched almost solely the contents of the Gospels, the profounder question of the sources it did hardly moot. Hence there was not only place but imperative call for Baur and the Tübingen School, with whom New Testament criticism in the more modern sense may be said to have begun.

The influence of their penetrating researches was clearly seen a generation later in Strauss's second 'Life of Jesus for the German People' (1864), less so in the brilliant romance of Renan, 'La Vie de Jésus,' in which keen sympathy, lively fancy, and perfect style vainly strove to supply the place of exact scientific criticism. Meantime another great voice in theology, Albrecht Ritschl's, had in his 'Entstehung der altkatholischen Kirche' (1857) openly renounced the Baurian two-term formula, Paulinism *versus* Petrinism, as unequal to the expression of the facts of early Christianity, and had founded the Ritschlian School, whose leaf even in the fifth decade is still green.

Practically all of this high argument, stretching through 70 years, has turned upon questions of date and authorship. The gravamen of the Tübingen contention consisted in referring the bulk of the New Testament to the second century and construing it as pseudographic and in some sense born of the Paul-Petrine controversy, reflecting it, or solving it, or smoothing it away. On the other hand, the Conservatives, largely aided by Ritschlians, held more or less firmly to the traditionary first century dates and authorship and minimized the antagonism between Jewish and Gentile Christianity.

All this has now been greatly changed. Dates and authors are not indeed unimportant, but they are no longer of prime significance. This follows at once from the principles already enunciated. If these much-debated compositions be really so highly compounded, then their dates and authors are not precisely determinable. Even if it were possible to discover the ultimate or the penultimate reviser, the question would remain as to the extent of his own contribution to the final whole; the fact that he wrote 150 A.D. might very well consist with the fact that some or most of his material appeared even in written form 150 B.C. Thus the units of the New Testament compound seem dissolving under our hands like an atom of radium, but without apparent loss of energy. With this regard the large enterprises of such as Volkmar and Zahn and Hilgenfeld are alike turned awry. At the same time, from this higher view point we can see the partial justification of opposing theories, the half-truth in each term of the contradiction. Radicalism has been right in detecting indications of late origin in many or all of these canonic Scriptures; Conservatism has been equally right in emphasizing the presence of more far older elements. But neither the one nor the other has been justified in any inference from one part to its neighboring part, much less to the whole. Side by side in the faulted and folded strata of a mountain range we may find fossils separated by many thousands of years. Though the apocalyptic prophecies of Mark xiii. be written before the catastrophe of Jerusalem, nothing follows as to the rest of the Gospel, which may have been written much later. Why

may they not have been written, at least in part, a hundred years earlier? They are not foretelling a *second* coming, but only *The Coming* of the Son of Man. Again, even if part of the parallels in Matthew and Luke do presuppose that catastrophe, which quivers still here and there in Matthew (Harnack, Chron., p. 654), it remains none the less true that these vivid pencilings may be only later touches of a revising hand. The body of the picture may still be generations older. In studying these Scriptures we are exploring the tossed ruins of a world, and each fragment must stand on its own merits. Questions then of age and authorship must still present themselves continually, but not under the old familiar forms.

There are two elements in the New Testament that are especially subject to considerations like the preceding: the philosophic, or rather theosophic,<sup>1</sup> and the gnostic. These are present in large measure, even in portions mainly personal and narrative. With respect to both it seems reasonably certain that the age is often very great. The theosophic doctrines repeat themselves under endlessly varying forms in Gnosticism. This latter phenomenon is now referred with increasing positiveness and definiteness to the first Christian and even pre-Christian century. Its wide-reaching roots stretch themselves away back into the alluvium of the Tigris and the Euphrates (see Anz, 'Ursprung des Gnostizismus'). As an offshoot or outgrowth or "acute secularization" (Harnack, D. G. I. 232) of Christianity, it is wholly inconceivable. The great historian of dogma himself annuls his own contention by recognizing a boundless extent of *Vorstufen* (op. cit., p. 226, 231 f.) for his secularization. These prestiges were confessedly pre-Christian, or at the very latest syn-Christian, and since they contained demonstrably and indisputably in this form or in that nearly the whole body of New Testament theosophism and much more, it follows irresistibly that the derivation of Gnosticism from Christianity is in every sense impossible. The two historical products were practically synchronous; since many of the Gnostic central thoughts were certainly centuries pre-Christian, it may be possible to regard Christianity as emerging from Gnosticism, but it is surely impossible any longer to regard Gnosticism as diverging from Christianity. To this general state of case there is explicit testimony in the book of Acts in chapter viii. 9-24, where Simon Magus is represented as an elder contemporary of Peter and Philip. The first preaching of the Gospel in Samaria found him already pre-occupying the ground, for many years he had been amazing the Samaritans, proclaiming some doctrine about the "Power of God, that called Mighty," which we know to be a Gnostic slogan. Now this Simon figures in the Fathers as the wellhead of Gnostic heresy; and it was both the habit and the dogmatic necessity of the Fathers to post-date, never to pre-date, the Heresies. Harnack admits the historicity and antiquity as well as the epic grandeur of Simon's attempt at universal religion. Strangely he regards this heresiarch, who had at the first preaching of the Cross for a "long time" been so omnipotent among the

<sup>1</sup> But we speak divine wisdom (*θεοῦ σοφία*) in mystery, 1 Cor. ii. 7.

Samaritans as to be considered by them a god — this precursor of Peter he regards as a "counter-part to Jesus" (Gegenbild zu Jesus). That Simonism was the elder is clearly indicated in Acts viii. 13, where Simon accepts the preaching of the Gospel, believes, is baptized, and attaches himself devotedly to Philip (προκαταρθεὶς τῷ Φίλιππῳ). The close affinity of Simon's preaching with Peter's is unmistakably hinted in the disclaimer of Peter (viii. 21), "There is not for thee part or lot in this Word." Moreover, we know from Origen (C. Cels. V., 62) that Simonians was, at least with the Gentiles, one of many names for Christians. This is not nearly all, however. We learn from Hippolytus that Simon was far from being the fountain-source of Gnostic heresy, at least of Gnosticism. He appears as only fifth in the chronological list. The first, antedating Gnosticism itself, and only later called Gnostics, are the all-important Naasenes, whence all the rest (Hip. Phil. v. 6). Compared with Naassenism, Simonism is visibly and palpably a much later development. Hence Naassenism is thrown back beyond the beginning of our era. There is no evading this argument *a fortiori*; witness the utter bewilderment of Bunsen in his Tabulation ('Hippolytus and his Age,' I, p. 236), where he says the Gnostics (Hip's. I-IV.) originated 70-99 A.D., but the later Simon belonged to the first age (27 to 65)!! With this early dating, and only therewith, do all the phenomena correspond. Now in this archaic pregnosticism we find already present, however inchoate, a goodly company of the most important and characteristic New Testament ideas: the Son of Man (Humanity = bar-nasha), the Man from Heaven, Citizen of Heaven, the Father, the new Jerusalem, the Choics, the Psychics, the Pneumatics, the Captives (Luke iv. 18; Rom. vii. 23), the Called, the Chosen, the Perfect, the Spirit, the new Birth, the Christ, the Jesus — all of these and more march in proud procession through the pages of Naassenism. The name *Jesus* for the Son of God is used in one of their hymns, which we have no reason for supposing post-Christian, which Harnack and Preuschen declare to be "ein naassenischer jedenfalls alter Psalm" ('Die Ueberlieferung und der Bestand der altchristlichen Litteratur,' p. 168).

The momentous fact confirmatory is that all these notions are used in the New Testament as perfectly familiar, needing no explanation. This presupposes that these notions already had a history lying behind them. We may be perfectly sure that they had been formed and defined and bandied about in frequent discussion long before they became encysted in apophthegms of the earliest Christian literature.

With respect to the gnomic element the case is quite as strong. The starry words of the New Testament are evidently stones that have been polished to perfection by the attrition of ages. That this literary peculiarity is due to the personality of Jesus can not be maintained. For since he must have spoken in Aramæan, not in Greek, the forms we have could be only translations. As reproducing words actually used by him, the renderings of Dalman and others have little value. Jesus and the Baptist are thought of as strongly contrasted, almost antipodal; but the style of the one is hardly

distinguishable from the style of the other. Both denounce the Pharisees as "generations of vipers" (Matt. iii. 7, xxiii. 33), both use precisely the same words about the Tree and the Fire (Matt. iii. 10, vii. 19). The variations found in the synoptic reports are precisely what might be expected in such anthologies. Let any one compare corresponding proverbs in sister languages or even different forms in the same language, for example, as given in Bartlett's 'Dictionary of Quotations,' and he will find almost exactly the same phenomena presented.

At this point the recent papyrus finds, with their new 'Sayings of (the) Jesus,' are of striking interest.<sup>1</sup> Clearly they are but *dissecta membra* of a once imposing organism. Such Logoi (not Logia) undoubtedly existed in that elder day in countless number. Oblivion has swallowed them up, as it has swallowed up so much of ancient literature. Here and there some few have escaped and are seen *rari nantes in gurgite vasto*. The salvage of our canonicos is like the Seven Tragedies of Sophocles — 7 out of 80! We may rejoice, however, in the belief that what has survived is the best — not all of it the best, nor all of the best, — but on the whole the most worth saving. The Christian consciousness has sifted and resifted, has tested the spirits whether they be of God; it has polished and refined, has set and reset the precious stones, until the great citadel of its faith gleams and flashes like the bejeweled gates of the New Jerusalem.

Examples of the long-continued process of perfectionment lie open to behold in our Gospels. Thus, in Luke vi. 17 the Jesus descends into a plain and teaches a great multitude eagerly pressing upon him. But in Matt. v. 1 he withdraws from the multitude into "the mountain" (of new legislation) and teaches "the disciples" only. In Luke vi. 20 he declares, "Blessed the poor, for *yours* is the kingdom of God"; but in Matt., "Blessed the poor *in spirit*, for theirs is the kingdom of the heavens." In Luke, "Blessed they that hunger now, for *ye* shall be filled"; but in Matt., "Blessed they that hunger and thirst *for righteousness*, for they shall be filled." In Luke, "Blessed they that weep now, for *ye* shall laugh"; but Matt., "Blessed they that mourn, for they shall be comforted." So, too, Matthew omits the "Woes" in Luke, supplying other beautiful beatitudes. That the Lucan form is older and has been immensely spiritualized in Matthew is too plain for argument, though it is not affirmed and not probable that Matthew has derived directly from Luke. Notice, too, that "they that mourn," "the meek shall inherit the earth," "they that thirst," "the pure in heart" are all Old Testament gems (Is. lxi. 2, Ps. xxxvii. 11, Is. lv. 1, Jer. xxxi. 24, Ps. xxiv. 3, 4) gathered into a new brilliant. Compare also Ps. cix. 28, cxvi. 5, 6 for the Lucan contrasts of weeping and laughing, cursing and blessing.

The primary form of the angelic song (L. ii. 14), it is now admitted, was: "Glory on high to God, and on earth peace among men of (His) good will," that is, His people Israel. Surely it is not hard to forgive the scribe who, by the omission of a single letter, *e*, of the last

<sup>1</sup> The formula "(The) Jesus says" seems to stand on precisely the same footing as the Old Testament parallels, "Thus saith Jehovah," and the like. Against Soltau.

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word, transformed it into "Glory on high to God, and on earth peace, among men good will."

Once more, the zenith of moral sublimity, before which Rousseau justly exclaimed, "Socrates died like a philosopher but Jesus like a God," is attained in the prayer on the cross: "Father, forgive them, for they know not what they do." Nevertheless, it is now bracketed by Lachmann and Westcott and Hort as a "Western" interpolation. Finally, mark how the Lord's Prayer as given in Luke (xi. 2-4) has been expanded and ennobled in Matthew (vi. 9-13).

Such examples, which may be multiplied indefinitely, may teach us how erroneous it is to suppose that the extra-canonic "Sayings" are less primitive, because less perfect in form and substance; on the contrary, their comparative crudity far more reasonably argues their comparative originality; "first blade, then ear, then full corn in the ear" (Mark iv. 28).

We come now still nearer the heart of the matter. In most of the foregoing we may hope for the general concurrence of critics, save such as Nösgen of Rostock. Few of the enlightened would now deny that the general mind of "the Church" has been largely formative of our present Scriptures. The more advanced would concede that it has even taken an active part in shaping the canonical "Biographies" of Jesus. The recent powerful and convincing work of Wrede admits no doubt on this point. Hear some of his emphasized conclusions: "To write a Life of Jesus meant for Mark not to report something about Jesus, it meant rather quite simply to narrate a life full of Messianic manifestations" ('Das Messiasgeheimnis in den Evangelien,' 1901, p. 125.) Again, p. 129: "The evangelic research of to-day proceeds throughout on the supposition that Mark in his historical narrative has the actual circumstances of the life of Jesus before his eyes, approximately distinctly, if not uninterruptedly. It presumes that he thinks outward from the Life of Jesus, that he motivates the individual features of his history according to the real circumstances of this life, according to the real thoughts and feelings of Jesus, that he concatenates in historic-psychologic sense the events that he sketches. In accord herewith it interprets, and in accord herewith it criticises the Gospel in detail. It assumes, to be sure, chronologic displacements, inaccuracies as to fact, alterations in the verbiage of utterances ascribed to Jesus, also an addendum of later dogmatic conception. But yet it operates everywhere with the psychologic necessities and probabilities that held for the personal actors in the given situations, it motivates in accordance therewith, it supplements the accounts with the consequences that flow therefrom naturally, and so covers with flesh the skeleton of dry dates. *This view and this procedure must be recognized as false in principle. It must be said openly: Mark has no longer any conception (Anschauung) of the historical Life of Jesus.*"

This is certainly one of the very most important deliverances of recent criticism. The characterization of the prevailing investigation of the Gospels is perfect, but it is unfortunate that Wrede has contented himself with a bare negation, however unshakably established.

"Herewith I will by no means prejudice the historic character of the materials, which I have not investigated. These materials may here be disregarded entirely" (p. 129). The same prevalent attitude has been clearly stated by Pfleiderer, though in much broader outline, when he declares with Strauss (against Ullmann) "the Christ of the Gospels is a creation of the faith of the church, but this faith an effect of the person of the historical Jesus." . . . "Historical science, which is concerned to understand Jesus as the originating source of Christianity," Harnack, while strenuously maximizing the trustworthiness of the Gospels in der *Hauptsache*, admits that, "however, here and there are mirrored even in them the conditions of the original community and the experiences through which it passed in later times" (p. 15). In other words, the later apostolic Christian consciousness transfigured more or less the primitive "Life of Jesus." Harnack would perhaps use still stronger language after reading Wrede. So we might go on quoting Feine, Bousset, Weiss, Keim, Jülicher, Holtzmann, Weizsäcker, Gunkel, Meinhold, and the rest. Enough. The transforming activity of the early Christian consciousness they do not deny; how high it is to be rated is yet unsettled; but after Wrede's work it will never again be rated so low as before.

Nevertheless, all these critics up to this time are harmonious on one point, however discordant as to others; they will all agree with their great spokesman, Pfleiderer, that the end and aim of the historical science of the New Testament "is to understand Jesus as the originating source of Christianity." How seriously historical science has taken this problem is above all evident in the great number of works, by men of first-class ability and intensely in earnest, bearing the title *Life of Jesus* or *Life of Christ*. 'Das Leben Jesu' was the title of the great apocalypse of David Friedrich Strauss. Since then we have had Renan's, and Keim's, and Weiss's, and Hase's, and Holtzmann's, and Réville's, and the like, not to mention Farrar's, and Geikie's, and Edersheim's. Even Volkmar, who, in his 'Marcus,' had, along with Hoekstra and Loman, broken the path since trodden by Wrede, resolving so much of the biography into symbolism, *Lehrgedichte*, and the like, even Volkmar must yet write his *Jesus Nazarenus*, sounding often like a recantation.<sup>1</sup> More than one of these works was of signal ability. Keim's was pre-eminently able. But even where no formal 'Life' was written, if the writer attempted any construction or interpretation of primitive Christianity, it was uniformly in terms of the Personality of Jesus. The consciousness of the Christ—that was the oldest Christianity, and, barring the acknowledged imperfection of the means and agents of transmission, that was the content of the Gospel as to us transmitted.

Here at least there is nothing in debate. Surely the problem has been clearly and definitely conceived; it has been firmly and reso-

<sup>1</sup> A like remarkable influence of critical consciousness made itself known in Loman, the Tiresias of the North, especially in controversy with Scholten. These keen critics, beside whom must be named their unhappy master, Bruno Bauer, had strange forebodings, extraordinary glimpses of the truth—they saw visions, they dreamed dreams. But their glittering structures lacked the solid foundation of scientific fact. No wonder then that they have sunk in a heap.

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lutely grasped; the materials for solution are not lacking in abundance; the expenditure of the widest, deepest, exactest learning, of zeal and abilities of the highest order, has been prodigal, and the methods employed have been infinitely varied;—what then, we may and we must ask, has been the net result? The answer can not be doubtful, absolutely *nil*! There is no exaggeration in this statement. Thus far it has been found utterly impossible to rationalize the Life of Jesus. Certain negative critical results have obtained more or less general recognition in critical circles, but they do not, however sure apparently, help us in the least “to understand Jesus as the originating source of Christianity.” On the contrary, they tend rather to make such understanding less and less possible. The theories developed in such capital works as Pfeiderer’s ‘Das Urchristenthum,’ or Harnack’s ‘Das Wesen des Christentums,’ or Heinrici’s ‘Das Urchristenthum,’ or Réville’s ‘Jésus de Nazareth,’ or McGiffert’s ‘The Apostolic Age,’ or the cognate treatises of Schürer, Hausrath, Weizsäcker, Votaw, and others, though lasting monuments of erudition, though brimful of ingenuity and sagacity, though widely illuminative and always pressing out further and further the bounds of our knowledge—all such are none the less disappointing as regards the capital point. In the last resort they are all equally impotent to make the Christian movement comprehensible or credible as an emanation from a personal focus, as a reaction from the Life and Death of the Man Christ Jesus. We might illustrate this fact by abundant citation, but there is no need to carry owls to Athens. Not one but must in the end beg the whole question, must abdicate the whole task, by assuming some uniqueness in this Personality, some absolute disparateness and incomparability with all other humanity. In other words, when under their inexorable analysis every trace of the miraculous<sup>1</sup> has vanished alike from Gospels and Acts, from Epistles and Apocalypse, there remains unshaken in tremendous majesty the one supreme Miracle of Miracles, the Heart of Heart in the New Testament, without Whom all other miracles are vain and contradictory, with Whom they acquire consistency and awful significance. The crumbling away of these outer parapets but lifts aloft into still bolder relief the impregnable strength of this inmost citadel.

The case then stands thus:

If Jesus be such a unique Personality as everywhere demanded by critical theory, in last analysis incomparable with the sons of men, then He was in some sense superhuman, it makes no difference in what sense, and neither His words nor His deeds are to be measured by the standard of men. Hence His miracles, one and all, remain miracles but cease to be wonders. We know of no reason why He should not have been born of a virgin, and walked on the waves, and raised the dead, and ascended into heaven, and endowed His disciples with any desirable spiritual gifts, and transmitted the Power of the Keys to an endless series

of infallible vicegerents. Nay, it becomes antecedently highly probable that He would and did do all this and much more; we should reasonably expect such a unique extra-natural being to do unique extra-natural things. We have no ground at all, then, for extruding or slurring or minimizing the non-natural element in the Scriptures, but every ground for retaining and accenting and even magnifying it. Accordingly, the strictly orthodox view appears alone consistent and rational, the liberal theology must ultimately commit suicide, however skilfully it may postpone the denouement to the last page of the last chapter. The unescapable question, “What think ye of the Christ?” must sooner or later precipitate the catastrophe. Greatly then as we admire and applaud the most enlightened scholarship of Europe and America, we must admit that at this critical pivotal point it has no standing before the bar of logic. This year-and-nay criticism has now for years been bankrupt.

When so many winged hounds of Zeus thus find that their quarry forever eludes them, the suggestion is inevitable that there is something radically wrong in their method of pursuit, that in some way their finest sense has betrayed them. We hold that the nature of their error is now at length an open secret. They have sought to explain Christianity as an emanation from a single individual human focus, as the reaction upon history and environment of a single human personality, they have sought “to understand Jesus as the originating source of Christianity”—they have failed and they must forever fail: for no such explanation is possible, because no such origination was real. Over against all such attempts we oppose the fact that every day comes to clearer and clearer light, that now flashes continually into evidence around the whole horizon of investigation, the fact that was perceived nearly a decade ago, but whose effective proclamation called for the publication of a series of preparatory investigations, the fact that the Genesis of Christianity must be sought in the collective consciousness of the first Christian and immediately pre-Christian centuries, that in the Syncretism of that epoch of the amalgamation of faiths, when all the currents of philosophic and theosophic thought dashed together their waters in the vast basin of the Roman circummediterranean empire, was to be sought and found the possibility and the actuality of a new faith of Universal Humanity, that should contain something appealing to the head and the heart of all men, from slave to emperor, a faith in which there should be no longer male and female, Jew and Greek, bond and free, but all should be one by virtue of a common Humanity, of the ageless, timeless, spaceless Son of Man.<sup>2</sup> It is as the outcome of this Syncretism, as the final efflorescence of the Judæo-Greco-Roman Spirit, of the Asiatic-European Soul, that Christianity is wholly intelligible and infinitely significant; the notion that it is an individual Palestinian product is the *Carthago delenda* of New Testament criticism.

That the drift of the most advancing thought and the most penetrating research is all in the direction indicated, can not escape the notice of the reader of the most recent

<sup>1</sup> Even criticism in the bosom of the Church of England spares now but two or at most but four of the miracles: The Incarnation and the Resurrection, with their “incidents,” the virgin Birth and the Ascension. See the recent controversy in ‘The Nineteenth Century and After.’

<sup>2</sup> ὁ υἱὸς τοῦ ἀνθρώπου = Bar-nasha = Human Being



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works of such as Pfeiderer, Gunkel, Bousset, Zimmern, Heitmueller, Dieterich, Seeberg, Wrede, Kreyenbühl, Usener, and their peers. Such is the unmistakable trend of historico-religious investigation. But this latter is very slow, and naturally very slow, to cut loose from the ancient moorings, to weigh anchor and commit itself to seas entirely unknown. Thus even Gunkel hesitated long ("nach langem Zaudern und manchen Erwägungen") before publishing his 'Zum religionsgeschichtlichen Verständnis des Neuen Testaments' (1903). He has therein spoken out bravely the great word (p. 95), "Christianity is a syncretic religion," even as Bousset had already declared: "Judaism, however, was the retort in which the different elements were assembled" (Rel. d. Judentums, p. 493).<sup>1</sup> Nevertheless, Gunkel tells us "*all this has been transferred to Jesus*," "When then Jesus appeared in his superhuman sublimity," and it avails little to add "that the christologic problem of the present is not merely historic and can not be solved in purely historical way"; so that, after all, we are advanced hardly an inch beyond the elder standpoint. In the same spirit Wernle declares that "Paul's utterance concerning Jesus was at bottom a myth, a drama, to which Jesus gave the name" (320). None the less, Wernle still deduces Christianity from this uniquely but merely human Jesus.

The amazing state of case, then, is this: The most piercing criticism detects nearly the whole body of Christian doctrine and practice in the mixed religions of the day, even the sacraments themselves. None of this, it feels sure, "can be derived from the teaching of Jesus; they show us how Christianity in its infancy was drawn into the chaos of Oriental religions" (Wernle). Nevertheless, it assures us that this teaching, *this* Jesus, remains the heart's core of Christianity. When now we ask, what then was this teaching, what this Personality? the answer rendered is arbitrariness itself. Since the critic feels constrained to explain 99 per cent of Christian theory and practice as derived from Judæo-pagan sources, as merely "transferred to Jesus," he is at liberty to choose the remaining 1 per cent as he will; he makes of the teaching precisely what he thinks it ought to have been, he declares Jesus did or did not teach this or that, because it conforms or does not conform to his idea of Jesus! But whence this idea? Certainly not from the Gospels, for these are saturated through and through with "transferred" elements; the only one that professes to be based on personal knowledge, the Fourth, is exactly the one that is rejected *in toto* as history, even by such a conservative critic as Harnack ("Especially the Fourth Gospel . . . can not be used as an historic source in the ordinary sense of the word" — D. W. d. C., p. 13)! No standard, then, is left but the caprice of the critic; he makes his own Jesus and conforms the Gospel thereto! If the Gospel contains contradictory or superfluous elements, they have been imported from the surrounding "chaos"! If it omits certain necessary or desirable features, it was because the religious consciousness of the writers was not free to assimilate them, but was bound fast by the his-

torical conditions that obtained! It is plain at a glance that nothing can ever come of such criticism, where the "poverty of the ascertained historical materials" is turned into endless imaginary wealth by "the uncontrolled power of combination and divination" (Pfeiderer). The focus, the burning point of investigation, must then be this *Personality*, which is thus the irresoluble residuum of the most inexorable analysis. But we may be absolutely sure that nothing can ever come of the arbitrary methods in vogue, all of whose airy constructions of the "Nazarene"

Are but dust that rises up  
And is lightly laid again.

Against every such theory of a unique deified Man, *still more* against the recent crudities of Kalthoff (Jesus merely a social-ethical Ideal!), while expressly holding important collateral questions in abeyance, it seems that criticism must now *explicitly postulate the aboriginal Godhood of the Centre of Christianity*, as appears at least from these considerations:

1. *The mere human Personality, which each critic postulates according to his own convenience, makes no great figure in the early propaganda.* Neither in the book of Acts, nor in the Epistles, nor in the oldest extra-canonic literature, can the keenest eye detect the after-effect of "the Carpenter" his words, his deeds, his life, his death; the Jesus, the Christ is everywhere conspicuous, towering like the Matterhorn, but everywhere supremely as an object of worship, as an over-earthly supernal Being, as a God ('The Outlook,' 66, p. 686 f., 1900). The greatest early preacher, The Apostle, apparently cared little or naught for the earthly history of Jesus, and preached Him solely as a Divinity. When Harnack and the rest talk of "the impression that he made upon his disciples and which they propagated," they forget the Pauline injunction not to be wise above what is written. Certainly, any such human Person as they assume must have made and left a regulative, overpowering, and ineffaceable impression; the fact then that no such impression at all is anywhere discernible, but quite the contrary, must teach us to revise their assumptions.

2. *The preaching of "the Jesus" was seemingly pre-Christian.* We have already mentioned the occurrence of the name and the idea in "an ancient psalm of the Naassenes" (Harnack), which we have no right to regard as post-Christian. It also occurs repeatedly, at least four times, in the 'Zauberpapyri' lately brought to light, especially at line 3120 of the great Paris Papyrus edited by C. Wessely, in a long "Hebraic Logos" which shows no trace of Christian influence, which is expressly attributed to "the pure men," and which the great master, Dieterich, positively ascribes to the (pre-Christian) Essenes. At line 3119-20 we read  
ἀρκίζω σε κατὰ τοῦ θεοῦ τῶν Ἑβραίων  
Ἰησοῦ . . . . "I adjure thee by the God of the Hebrews, Jesus."

As the end of controversy on this point we cite Acts xviii. 25, where of the learned and eloquent and zealous Apollos of Alexandria it is said, "He was wont to speak and teach accurately the doctrine of the Jesus (ἐλάλει καὶ ἐδίδασκεν ἀκριβῶς τὰ περὶ τοῦ Ἰησοῦ), *knowing only the baptism of John.*" The phrase italicized excludes

<sup>1</sup> Most characteristically Bousset adds: "Then resulted through a creative miracle the new formation of the Gospel."

all possibility of biographical reference to the Jesus of the Gospels, and shows incontestably that the cult of the Jesus was fervently propagated far and wide in ignorance of the earthly Life of Jesus.

3. The Epithet "Nazorean" (*Nazapaiõs*, *Naṣapaiõs*, *Naṣapnõs*) is *not* derived from Nazareth, a seeming topographic fancy, but is a divine appellative derived from the Old-Semitic stem *NaṣaR*, meaning to *keep, guard, preserve*, frequent in the cuneiform inscriptions (*na-ša-ru*) as far back as 2250 B.C., constant in the Old Testament, where *Nōšrim* means *watchers*, precisely the term by which the Talmud designated the Christians (*NaZoReans*). The epithet *Nazorean* would mean then *Servator*, almost the same as *Salvator* (Jesus), which are both used to render the Greek *Σωτήρ*. The Syriac form *Naṣaryā* suggests, but does not prove decisively, that the termination refers to the divine name *Yah*. So that *Naṣaryā* would mean *Servator—Yah*. (See 'The Monist,' January 1905, pp. 25-45.)

4. The "*Nasaraioi*" were certainly "before Christ" and "knew not Christ," to quote Epiphanius (Pan. Haer. xxix. 6). The name is the same as *Naṣaryā* (Syriac for Nazarene) and indicates that they worshipped God (*Yah*) under a particular aspect or *Person*, namely, as Protector, Preserver (*N—S—R*). The notions of *Servator* (*Nazap—nos*) and *Salvator* (*Ἰσους*, ) being hardly distinguishable, we naturally get the double title Jesus Nazorean. The fusion of this notion of *Saviour* with the more orthodox notion of *Messiah* (*Chrestos*)<sup>1</sup> gave rise to the slogan of Paulinism, *the Jesus—the Christ*; this fusion was perhaps distinctively the work of Paul.

5. *Primitive Christianity seems not unifocal but multifocal in origin and development*. It does not emerge full-fledged at Jerusalem and encompass the Mediterranean with the flight of an eagle. The "astoundingly swift" (Heinrici) spread of the Gospel seems only apparent. In reality it seems everywhere in the air, a divine contagion. It springs up almost simultaneously in Jerusalem, in Antioch, in Damascus, in Alexandria, in Rome, in Crete, in Libya, in Ephesus, in Corinth<sup>2</sup>—wherever in the Dispersion the seed was sown. The book of Acts makes two attempts to explain this multifocal fact in accord with its own unifocal theory. It assembles at Pentecost "in Jerusalem, dwellers, Jews, devout men from every nation that is under heaven," who, "each one in his own dialect, heard them (the Apostles) speaking." The other is found in the mighty persecution that arose against the Church in Jerusalem after Stephanos was crowned with martyrdom. "All were dispersed except the Apostles." But these were really the only or at least the principal offenders, the very ones that would have been dispersed first of all. Immediately after, the Church had peace, was built up and multiplied (Acts ix. 31), and, not many years after, the believers in Jerusalem number many myriads, all zealous for the law (Acts xxi. 20). The fact of multi-

plicity is clearly implied in these abortive attempts to trace it back to a higher unity: The other evidences are strewn through the book of Acts; they are scattered and broken lights, but gathered up and focused by the lens of criticism they glow with surprising brightness.

So far the investigation has been carefully made, and so much appears "very probable." Still other kindred inquiries are in progress, but of these the results must be awaited. Enough, however, seems established to show that the "hopeless confusion" of Rationalism, in its century-old essay to interpret Christianity from the *Man* Christ Jesus as the assumed sole human personal animating centre, must remain forever confused and hopeless, for no such interpretation can ever be correct. On the contrary, this most interesting and most important of all historic phenomena is comprehensible and must be comprehended as a total product of the totality of historic-religious-philosophic-ethic conditions prevailing around the Mediterranean, as a phenomenon which itself came not with observation, so that no man could say "Lo here!" or "Lo there!" but which emerged to view from the fermentation of three centuries and lightened like the dawn of a polar day round the whole horizon from the East even unto the West. This prodigy, this heir of all the ages, appeared at first under many forms, with many slogans and battle-cries, of very varying degrees of worth. It was the work especially of the second century to rally the straggling and sometimes contending arrays under one banner, to select and unify and communicate what was best in each, and to reject and excommunicate what was bad or irreconcilable. The organic result was the Old Catholic Church,—as its name implies, the *totalization* of a host of originally more or less independent elements. Here, however, we are brought to the borderland of theology, and here we must pause, for that border we dare not cross. Many important consequences seem to present themselves naturally, but these must be left for the reader to recognize. If the deep-eddy stream of criticism, whose swift descent we have followed through the century, has now at last surmounted and surpassed every bulwark of tradition, we need only reflect that it is a cleansing and a fertilizing flood, the river of the waters of life, that has been poured abroad over exhausted fields, and that the inundated plains will blossom and brighten anew with abundant blessing.

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<sup>1</sup> The earlier form, see Blass *Gram. d. nt. Gr.* § 27, 4. Compare also Ps. xxxiv. 8, quoted by Clem. Alex., *Adm. in Gent.* 56 C. Syll., taste and see that *Christos* is God, where the Septuagint has *Chrestos* (good) is the Lord.

<sup>2</sup> As is proved by microscopic scrutiny of Acts.

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nack, 'Die Mission und die Ausbreitung des Christentums' (1902); Hawkins, 'Horæ Synopticæ' (1899); Heitmueller, 'Im Namen Jesu' (1903); Hilgenfeld, 'Die Ketzergeschichte des Urchristenthums' (1884); Holtzmann, 'Lehrbuch der Neutestamentlichen Theologie' (1897); Jülicher, 'Die Gleichnisreden Jesu' (1899); Kreyenbühl, 'Das Evangelium der Wahrheit' (1900); Lietzmann, 'Der Menschensohn' (1896); Lightfoot, 'Biblical Essays' (1893); Loisy, 'L'Évangile et L'Église' (1902), 'Le quatrième Évangile' (1903); Loman, 'Quæstiones Paulinæ' (1882-6), 'Nalatenschap' (1899); Van Manen, 'Paulus' (1890); Mayor, 'Epistle of Saint James' (1892); Merx, 'Die vier kanonischen Evangelien' (1897); Nestle, 'Einführung in das griechische Neue Testament' (1899); Pfeiderer, 'Der Paulinismus' (1873); 'Das Christusbild' (1904); Reitzenstein, 'Poimandres' (1904); Schmidt, C., 'Acta Pauli' (1905); Schmidt, N., in 'Encyc. Bibl.'; Schmiedel, 'Winer's Grammatik' (1894), 'Encyc. Bibl.' *passim*; Seeberg, 'Der Katechismus der Urchristenheit' (1903); Soden, 'Die Schriften des Neuen Testaments' (1902); Soltau, 'Unsere Evangelien' (1901); Spitta, 'Geschichte und Literatur des Urchristenthums' (1893-6-1901); Usener, 'Religionsgeschichtliche Untersuchungen' (1889); Weiss, 'Die Offenbarung Johannis' (1904); Wendland, *Zur Apokalypse* (in Preuschen's 'Zeitschrift,' 1904); Zahn, 'Geschichte des Neutestamentlichen Kanons' (1888). Commentaries: Hand-Kommentar, Meyer's, Zahn's, Schanz's, International Critical, Strack-Zöckler; 'Encyclopædia Biblica' (edited by T. K. Cheyne and J. S. Black, 1899); 'Dictionary of the Bible' (edited by J. Hastings and J. A. Selbie, 1898). Introductions: Bacon (1902); Baljon (1893); Hilgenfeld (1875); Holtzmann, (1892); Salmon (1885); Trenkle (1897); Weiss (1897); Zahn (1897); Jülicher (1893).

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**New Testament Criticism. Triple Evidence.**—Logicians distinguish between metaphysical, physical, and moral evidence for the things we know. Metaphysical evidence is based on the unchangeable essences of objects or on the analysis of our concepts; for example, the whole is greater than its parts. Physical evidence is based on the conditional stability of the laws of nature; for example, the sun rises in the east and sets in the west. Moral evidence is based on the testimony of a witness; it implies that we have the genuine words of the witness, and that the witness is endowed with the necessary knowledge and veracity. The New Testament does not furnish us either metaphysical or physical evidence; we have to be content with moral evidence. And even this is not of the highest order. We do not listen to the words of eye-witnesses, but we have only a number of historical and doctrinal writings to consult. Again, we do not possess a single autograph of these writings; our New Testament text has been copied and copied again, edited and edited again, so that at present not a single verse reads exactly alike in all copies and editions. The very words of our witnesses seem to have become uncertain. Moreover, doubt has been raised as to the knowledge and the veracity of our New Testament writers; their evidence has been pronounced unreliable even in those

passages in which their words are practically certain.

**Criticism.**—For these reasons the principles of criticism must be applied to the books of the New Testament. Lower or textual criticism will inquire into the genuineness of each verse and of every word of the New Testament. Higher criticism will investigate the authenticity of the entire New Testament books, and will test their reliability. Meanwhile, let not the metaphysician and the scientist underrate the evidence furnished by the New Testament writings. It is the evidence on which history is built; even the abstract thinker is content with this kind of evidence as soon as he leaves the region of speculation and enters into practical life.

**Lower or Textual Criticism.**—Lower or textual criticism strives to restore the original text of the New Testament. Its method consists generally in a reversal of the process by which false readings have penetrated into the text. The original readings are suggested partly by the ingenuity of the critic, partly by the text of early manuscripts or of patristic quotations or again of early versions.

**Original Manuscripts.**—The original copies of our New Testament books must have been lost very early. No early Father appeals to the original manuscript in defence of his own peculiar reading of the text. Tertullian (*de præscript.* 36) and Peter of Alexandria (*de pasch.* vii.; Migne, P. G. xviii. 517, 520) are no exceptions. Tertullian's words concerning the Pauline Epistles do not necessarily imply the existence of the original copies; and Peter's testimony is based on late authority. Neither can it be said that a fragment of Mark's original Gospel is still kept in Venice (Baron., *Annal.* ad ann. 485), and that the copy of Matthew's Gospel written by Barnabas is still extant in Constantinople (Assem., *Biblioth. orient.* ii. pp. 81 ff.); for both relics are spurious.

**Early Variations.**—Some of the early ecclesiastical writers are of opinion that the New Testament text was corrupted intentionally by the heretics. This view is expressed by Irenæus (*c. hæ.* i. 27; Migne, P. G. vii. 638), Dionysius of Corinth (*Eus.* H. E. iv. 23; Migne, P. G. xx. 388 ff.), Tertullian (*c. Marc.* v., *passim*), Eusebius (*H. E.* v. 28; Migne, P. G. xx. 516), and Epiphanius (*hæ.* xlii. 9 ff.; Migne, P. G. xli. 708). We do not deny that heretical writers may have introduced one or another variant, but they cannot be held responsible for the great bulk of different readings. Nor are we at a loss to account for the early appearance of variations. (1) Oral tradition was prized higher in the earliest times of the Church than the written word. (2) The dogma of inspiration was not sufficiently well developed to demand a special amount of accuracy on the part of the copyists. (3) Most copyists did not work as official scribes of the Church, but transcribed the text for the use of private persons. (4) It must also be kept in mind that the scientific accuracy of later days was not a characteristic feature of the first centuries. (5) Finally, the copyists were fallible men, and as such they were not exempt from the various sources of accidental error to which all scribes are subject.

**Earliest Witnesses for Variations.**—Among the earliest witnesses for the existence of va-

riants in the New Testament text must be reckoned Polycarp, Hegesippus, Papias, the Elders of Irenæus, Justin, Theodotus, the Churches of Vienne and of Lyons, Marcion, Ptolemæus, Heracleon, and Tatian. Nor can the variants, for the existence of which they testify, be regarded as mere accidental slips of memory. Polycarp's quotation of Act. ii. 24 (ad Philipp. i. 2) disagrees with nearly all Greek codices and early versions, but it agrees with cod. D, the Vulgate, and several other versions. The double reading of this passage must then have existed even in his days. Irenæus (adv. hæc. 30. 1; Migne, P. G. vii. 1203) appeals to ancient and accurate manuscripts in defence of a certain reading. Clement of Alexandria, too (Strom. iv. 6; Migne, P. G. vii. 1252), cites variants of certain passages. Various readings must therefore have been quite common in the 2d century. In the 3d century Origen complains of the great diversity in the codices (in Matt. xv. 14; Migne, P. G. xiii. 1293), and during the course of the 3d century Jerome attests that the evil grew rather than diminished (ad Dam., præf. in evang.). After the 4th century the occurrence of variants is attested by existing manuscripts, patristic quotations, and faithful translations.

*Incipient Stability.*—It has been believed that Origen was the author of a revised text of the New Testament. But this opinion can hardly be reconciled with Origen's own words (in Matt. xv. 14; Migne, P. G. xiii. 1293). On the other hand, many learned men did not consider it below their dignity to aid in the transcription of the sacred text. Eusebius and Jerome (H. E. VI. xxxii. 3; de vir. ill. 75) testify that Pamphilus had transcribed certain texts. Jerome again (ep. 34; al. 141) tells us that the priests Acacius and Euzoius had been engaged in transcribing the sacred text in the library of Cæsarea. In other passages Jerome shows his esteem for the manuscripts written by Adamantius and Pierius (in Matt. xxiv. 26; in Gal. iii. 1; Migne, P. L. xxvi. 181, 348), the latter of whom was one of Origen's successors in the presidency of the Alexandrian School; but neither Jerome nor Eusebius can be cited as a witness for a text revision by either of Jerome's favorites (cf. Eus. H. E. vii. 32; Migne, P. G. xx. 732). True text revisions appear to have been edited by the Egyptian bishop Hesychius and the Antiochian priest Lucian. It is true that Jerome's words (ad Dam., præf. in evang.; de vir. ill. 77) are not as clear and definite as one might desire. Still they show that Hesychius and Lucian had paid considerable attention to the problem of the New Testament text. Hug, Eichhorn, and W. Bousset have ventured to suggest that the work of Hesychius has been preserved in the so-called Alexandrian group of New Testament variants, while that of Lucian is variously connected with the Byzantine or the Neutral group. But no proof for either view has thus far been advanced. It cannot be denied, however, that from the 4th or 5th century onward the variants in the New Testament crystallize into several types or forms, differing according to the country in which the respective manuscripts were written, the versions were made, and the citations were employed.

*Causes Which Effected the Stable Text Groups.*—We have said that the different

groups of variants were more or less attached to their place of origin. But loyalty to the customs of particular places was not the only cause of the incipient text stability. The following considerations will suggest additional reasons: (1) The local ecclesiastical authorities naturally insisted on having the transcriber copy the text current in each particular Church. (2) After the Church began to enjoy the blessings of peace under the reign of Constantine, the bishops had better opportunities to regulate the interior affairs of their respective dioceses (cf. Sozom., H. E. i. 11; Migne, P. G. lxvii. 889). (3) Owing to Diocletian's decree concerning the destruction of sacred books, many copies of the New Testament had been destroyed during the late persecution, so that the number of the model texts was greatly reduced (Eus., H. E. viii. 2; Migne, P. G. xx. 745). (4) Finally, the Emperor Constantine charged Eusebius with the transcription of 50 new codices which were donated to the various imperial foundations and thus became the model text for innumerable other copies (cf. Eus., Vit. Constant., iv. 34, 36, 37; Migne, P. G. xx. 1181 ff.). Here we have an explanation of the fact that the so-called Syrian or Byzantine group of texts attained such an overwhelming popularity.

*The Written Text from the 4th to the 16th Century.*—Though from the 4th century onward the particular Churches had their own peculiar groups of variants which they propagated in preference to other readings, it must not be imagined that the lines of demarcation between these text-families are mathematically accurate. Suppose we denote by 1 the text peculiar to the Church A, by 2 that current in the Church B, by 3 that peculiar to the Church C, etc., then the text peculiar to the Church Z will not be entirely new, but in all likelihood it will be a mixture of 1, 2, 3; and the text of the Church Y will be a mixture expressed by 3, 2, 1; and similarly the text of the Church X will be the mixture of 2, 1, 3. And while the codices were thus propagated, fairly faithful reproductions of parts of the text were kept for us by Eusebius, Athanasius, Epiphanius, the two Cyrils, Basil, the two Gregorys, Chrysostom, Theodoret, and Ephræm. To these illustrious men must be added Andrew of Cappadocia for the 5th century, Venerable Bede, John Damascene, and Alcuin for the 8th, Photius for the 9th, Suidas and Arethas for the 10th, Theophylactus, Ecdemnius, and Euthemius for the 11th and 12th, the Correctoria for the 13th, and Laurentius Valla for the 15th. And this is by no means an exhaustive list of men and works important for textual or lower criticism.

*New Testament Codices.*—Greek manuscripts are divided into uncials and cursives or minuscules. In uncial writing all the letters are large and divided. The other class of manuscripts is called minuscule, because its letters are small; it is called cursive, because its letters are linked together in a running hand. Broadly speaking, the manuscripts written before the 10th century are uncial; those written between the 10th and the invention of printing (1454 A.D.) are minuscule or cursive. Not counting 8 manuscript psalters containing the text of the hymns found in the third Gospel, the New Testament uncials number 114; 2 of these belong to the 4th century, 15 to the 5th,

24 to the 6th, 17 to the 7th, 19 to the 8th, 31 to the 9th, 6 to the 10th. But only one of all these contains the complete text of the New Testament; 4 others contain the greatest part of it. Besides these 5, there are 81 gospel manuscripts (12 complete or nearly so, 14 partial ones, and 55 fragmentary), 13 of the Book of Acts (5 complete or nearly so, 8 more or less fragmentary), 5 of the Catholic Epistles (4 more or less complete, 1 fragment), 20 of the Pauline Epistles (7 more or less complete, 13 fragmentary). There are 4 complete manuscripts of the Apocalypse, and 1 defective one. Of the cursive manuscripts more than 1,200 contain the Gospels, more than 400 the Book of Acts, more than 500 the Pauline Epistles, more than 180 the Apocalypse. Besides, textual criticism knows more than 260 lectionaries with fragments of the Book of Acts and of the Epistles, and more than 950 evangelistaria, about 100 of which are uncial manuscripts. The investigation into the origin and the relationship of the various cursive manuscripts is far from being complete. To facilitate reference, the uncial manuscripts were denoted by capital letters, either Latin or Greek or even Hebrew, while the cursives were indicated by Arabic figures. H. Fr. von Soden has changed this notation considerably. On the list arranged according to this improved plan, not merely the identity of Soden's 2,328 manuscripts is indicated, but also their age and contents ('Die Schriften des Neuen Testaments in ihrer ältesten erreichbaren Textgestalt hergestellt auf Grund ihrer Textgeschichte'; Bd. i.).

*The Printed Text.*—It was in 1516 that Erasmus published the first printed edition of the Greek New Testament text. He based his work on six manuscripts at most; of these none was complete, and only one valuable. New and improved editions of the Erasmus text were issued in 1519, 1522, 1527, and 1535. Meanwhile, the polyglot edition of Cardinal Ximenes, which had been prepared with much greater care, and had left the press on 10 Jan. 1514, was published in 1522 (perhaps in 1520); but being limited to 600 copies, it never reached a large circulation. Not to mention other reissues of these two main editions, Robert Estienne or Stephanus repeated in his third and fourth editions (1550, 1551) almost the pure Erasmus text, adding in the margin variants based on 15 manuscripts and the polyglot of Ximenes. The English *Authorized Version* and the so-called *Received Text* current in England follow the third edition of Stephanus. His fourth edition is the first Greek text divided up into verses. Among its numerous re-editors, Th. Beza and the Elzevir Brothers deserve the first rank. The preface of the second Elzevir edition, which appeared in 1633, contains the words "*textum habes nunc ab omnibus receptum*." Hence the reprints of this text, and there are more than 170, are simply called the *Received Text*. In brief then, the *Received Text* is the text of the second Elzevir edition, which appears to be a repetition of the Bezan text. This latter is the fourth edition of Stephanus corrected according to several notes of Henry Stephanus, some ancient versions, and the Codex Claramontanus. In its turn, the Stephanus edition is a repetition of the fifth Erasmus edition, and the latter is based on codd. 1 and 2 for the text of the Gospels,

on cod. 4 for the text of Acts, on cod. 7 for the Pauline Epistles, on cod. 1 for the text of the Apocalypse, in such a way, however, that the successive reprints of this highly composite text were slightly emended according to a few other text sources.

*Critical Apparatus.*—Robert Estienne (c. 1546) and Th. Beza (c. 1565) are rightly considered as the pioneer collectors of an apparatus for the textual criticism of the New Testament. Br. Walton (c. 1657) and John Fell also co-operated at the building up of such an apparatus, but they were far surpassed by Mill (c. 1707), who collected about 30,000 variants out of more than 100 sources. Bengel (1687-1752) first divided the various readings into groups. He distinguished between an African and an Asiatic or Byzantine type of variants. Semler (c. 1740) and Griesbach (1745-1812) distinguished three text groups: the former called his divisions the Alexandrian, the Occidental, and the Oriental or Byzantine family; the latter named his groups the Alexandrian, the Occidental, and the Constantinopolitan. Eichhorn (c. 1820) and Hug (c. 1840) agreed with Griesbach, but Scholz (c. 1850) returned to the double division into Alexandrian and Byzantine readings. Tischendorf (1815-74) acknowledged four different types of text, an Alexandrian, a Latin, an Asiatic, and a Byzantine; Tregelles (1813-75) favored again a dual division of texts, naming them the Constantinopolitan and the Alexandrian group. Finally, Westcott and Hort introduced four text families: the Syrian, the Occidental, the Alexandrian, and the Neutral. The Syrian text is the vulgate text in the Greek Church since the middle of the 4th century. It is supposed to be a revised edition of a pre-Syrian vulgate text. This latter exhibits three peculiarities: one group of its variants is remarkable for paraphrases, interpolations, amplifications, and omissions; this text constitutes the Occidental group. Another group of variants is peculiar for its grammatical and scholastic emendations, and this is called the Alexandrian. A third set of variants, though pre-Syrian, shows neither the diffusiveness of the Occidental text, nor the nicety of the Alexandrian; it is therefore called the Neutral group. Now, since the Syrian text figures as the vulgate of the Greek Church after the middle of the 4th century, and since about a century must be allowed for the rise and passing away of the Occidental and the Alexandrian families, the Neutral type of variants must have been the common text during the course of the 2d century. But it cannot be maintained that these premises and conclusions are admitted by all textual critics.

*Critical Editions of the New Testament.*—After the *Received Text* had become the current Greek text, it began to be regarded as quite sacred. Mill, Bengel, and Wetstein collected various readings differing from the *Received Text*, but they did not dare to introduce them into the body of the New Testament. It was Griesbach who first changed the *Received Text* according to the authority of various manuscripts; but not even Griesbach had the full courage of his conviction. Besides, he was not acquainted with some of the oldest manuscripts discovered after his time (c. 1777). We need not delay over some of the less important edi-

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tions published by Mace, Harwood, Matthæi, Alter, Scholz, Schott, Knapp, Tittmann, Hahn, Theile, and others.

Lachmann (1793-1851) was the first who endeavored to construct a new text out of the oldest manuscripts known to him. Believing it impossible to restore the original text, he tried to reconstruct the readings that had been current in the Church during the course of the 4th century. For this purpose he confined his study to a few of the oldest manuscripts, together with a few of the Fathers, and the best codices of the Latin Vulgate. He simply counted the authorities in favor of each reading, and then followed the majority. Though the text thus prepared is far better than the *Received Text*, it is based on too small a number of witnesses, on too slight a knowledge of the few manuscripts actually used, and on too mechanical a method of using them.

Tischendorf's services in the publication of manuscripts have probably done more to establish textual criticism on a sound basis than anything else. Besides, he published at least 8 (according to another method of reckoning, 21) editions of the New Testament. It is to be regretted that he did not use his material more consistently and scientifically. Between 1841 and 1849 he differs considerably from the *Received Text*; between 1849 and 1869 he approaches quite closely to it; but after 1869 he again diverges from it. His last, or eighth edition (1864-72) still remains the standard collection of evidence for the Greek text. The prolegomena (1884-94) to this edition are the work of Gregory; they give an account of the manuscripts, the versions, and the patristic quotations.

Tregelles (1831-75) published two manuscripts, and collated many others with great accuracy, thus preparing his material for a revised Greek text. He based his edition exclusively on the most ancient authorities, but he used a larger number of them than Lachmann had done. Like his predecessors, he did not follow the principle of grouping in his new edition, so that the choice of his readings depends somewhat on personal preferences. Alford, Lightfoot, Weiss, and others also have devoted a good deal of study to the New Testament text, but more with a view to its proper interpretation than its emendation.

Finally, Westcott and Hort have given us a new edition of the New Testament text based on the principle of grouping as explained under the preceding number. By adhering to the Neutral readings, they believe they reproduce the text current in the Church during the course of the 2d century. This edition has met with determined opposition, especially on the part of Scrivener and Burgon. These two scholars maintain that in the reconstruction of the Greek text all available authorities must be considered, and the most ancient must not be given the sole right of being heard. J. B. McClellan, too, based his English version of the Gospels (1875) on a revision of the Greek text, in which internal probability is taken as the most trustworthy guide in the selection between variants. Other good editions of the Greek text have been published by Weymouth, Gebhardt, Nestle, Brandscheid, and Hetzenauer.

*Recent Discoveries.*—In recent years quite

a number of discoveries have been made which have an important bearing on the textual criticism of the New Testament. The Arabic text of Tatian's 'Diatessaron' has come to light, and was edited by Ciasca in 1888. The so-called second Epistle of Clement was discovered by Bryennios in 1875. In the last named manuscript was also contained the Teaching of the Apostles, but it was not made known till 1883. A fragment of the Gospel of Peter was discovered in 1886 by members of the French Archaeological Mission, who conducted excavations in the cemetery of Akhmim, in upper Egypt. The Sinaitic Syriac manuscript was discovered by Mrs. Lewis and Mrs. Gibson in 1892, during their visit to the Monastery of Saint Catharine, on Mount Sinai. Part of the Codex Purpureus was brought to light in 1896 in the neighborhood of Caesarea. Finally, some Sayings of our Lord were discovered by Messrs. Grenfell and Hunt in 1896 and 1903 on the site of the ancient Oxyrhynchus, in Egypt.

*Results.*—Confining ourselves to general statements, we may derive the following conclusions from what has been said: (1) The material for the textual criticism of the New Testament is constantly growing. (2) In Mill's time the number of variants in the New Testament was estimated at 30,000; in 1874 Scrivener counted at least 120,000; Schaff stated in 1892 that they did not fall much short of 150,000. (3) There are more variants than words in the New Testament; in fact, there are about 20 variants to each single verse, and they increase with each new discovery. (4) Lower criticism shows that we need not be alarmed at the number of these variants, and that the substance of the New Testament is absolutely certain. (5) Dr. Hort, who is surely good authority in this question, tells us that "the amount of what can in any sense be called substantial variation . . . can hardly form more than a thousandth part of the entire text." (6) Kaulen enumerates only four passages in which the variants touch matters of faith: Mk. i. 1; Act. xx. 28; 1 Cor. xv. 51; and 1 Tim. iii. 16. But our faith is not affected by these variants; the revealed truth contained in these four passages is sufficiently certain from other texts of the New Testament. (7) Our classical scholars are satisfied that we possess the true text of those classical works of antiquity that have come down to us, though our knowledge of these works depends on a mere handful of manuscripts, while the manuscripts of the New Testament are counted by hundreds and even thousands. (8) The fact that our New Testament variants differ only in form, not in substance, excludes the hypothesis that it is the result of syncretism. The very defenders of this hypothesis seem to feel the difficulty; hence they declare that the New Testament presents "a syncretism without parallel in literature, unless in the Old Testament." (9) The number of manuscripts, of ancient versions, and of patristic quotations, is so great that it is practically certain that the original text of the New Testament is preserved in some one or another of these ancient authorities. This cannot be said of any other book of antiquity.

*Higher Criticism.*—The name Higher Criticism (q.v.) implies that it deals with problems more important than those of the textual or



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lower criticism. These problems are the questions concerning the integrity, the authenticity, the literary form, and the trustworthiness of the various books. In the case of profane writings, these topics have been considered by a science called Literary Criticism. The higher critic ought to employ in his work not only the evidence of the literary work itself, but also external evidence that may be at his command. The internal evidence comprises the style of the book, the views of its author, allusions to past or contemporary events, geographical and chronological data, religious, moral, and political principles, grammatical forms, lexicographical peculiarities; in fact, all the details that offer a solid basis for comparing the work under consideration with other literary products of the same period of time or by the same author. After all these elements have been considered, the actual work of comparison can safely be undertaken.

*Faults of Higher Criticism.*—We do not say that all higher critics are sophists, nor do we imply that sophistry occurs more frequently in higher criticism than in any other branch of human science; we wish only to point out some faults that higher critics have actually committed in their process of reasoning. (1) Many higher critics begin their work with a prejudiced or biased mind. While the orthodox inquirer cares very little whether he has to admit a supernatural fact more or less, and is therefore free to follow objective evidence, the unbeliever is pledged *a priori* not to admit any supernatural fact, seeing that a single fact of this kind would upset all his theories. If Christianity, they say, originated from Jesus, then he must have been superhuman. But nothing superhuman must be admitted at any cost. Hence Christianity must be considered as the syncretism of its age, the last efflorescence of the Judæo-Greco-Roman Spirit. And all this vague terminology blinds them to the fact that this hypothesis involves a greater miracle than they have sought to avoid. (2) The higher critics often infer *a posse ad esse*; they imagine that a certain fact can be explained according to a given hypothesis, and forthwith that hypothesis is upheld as the only explanation. History and common sense may go against their inference, but all this cannot make them change their point of view; *stet pro ratione voluntas*. (3) The higher critics often change the degree of certainty of their contentions as they go along. First, something *may* be true; next, it is *probably* true; again, it is *certainly* true; finally, they actually refer back to their preceding statement with the words, "we have *proved* this to be so." (4) The argument of silence, too, has been highly favored by certain higher critics, though no regard was paid to the conditions under which alone this argument is of any value. (5) Again, higher critics are apt to pronounce judgment on topics outside their sphere of study. They claim to give an opinion on matters theological, philosophical, historical, scientific without the least hesitation; they even feel aggrieved if their criticism is criticised.

*First Beginning of Higher Criticism.*—The name higher criticism is of comparatively recent origin, but its principles are very old. In the last century before Christ, Dionysius of Halicarnassus won great renown by his crit-

ical acumen. In the early days of the Church, too, the books of Scripture were defended against the attacks of a Porphyry and a Celsus by men like Clement of Alexandria, Origen, Eusebius, and Jerome by an appeal to the principles that are employed by our present-day higher critics. It is true that during the course of the succeeding ages our great Christian scholars were imbued with too great a reverence for the inspired books to subject them to the critical process applied in the case of profane literature. Still, there were notable exceptions even to this rule. The introductory treatises to the Bible as a whole or to its several books were applications of critical principles. Richard Simon (1638-1712) applied the same in a pre-eminently masterful way in his famous work, 'Histoires Critiques du Vieux Testament, du Texte et des Versions du Nouveau Testament.' The erudite works of Dom Calmet, too, give evidence of skilled critical inquiry.

*The Age of Scoffers.*—Though raillery is no longer the equivalent of argument, it is instructive to review the attempts made to undermine the authority of the Scriptures by means of this weapon. Among the scoffers Voltaire holds a pre-eminent place. The tradition that he copied his difficulties against the credibility of the Bible out of Dom Calmet's works without either adding their solution or indicating his sources, is too well known to need repetition. In his wake followed the French encyclopædists. A panegyrist calls Voltaire the king who succeeded Louis XIV., and who handed the royal sceptre over to Napoleon. Among his ministers figure such celebrated men as Diderot, D'Alembert, Buffon, Helvétius, D'Holbach, D'Argens, Lamettrie, Turgot, Condorcet, and in a way also Rousseau and Montesquieu. The king himself had learned his trade among the Deists of England, whither he was forced to withdraw in 1726, and where he remained for about two years. Cherbury, Toland, Tindal, Woolston, Collins, Bolingbroke, Chubb, Whiston, Shaftesbury, Whittey, Somers, Wharton, Shrewsbury, and Buckingham figure among the principal apostles of English Deism.

*Rationalism.*—In Germany three forces had been at work to prepare the minds of the people for disbelief in the New Testament: First, the Wolfian philosophy had freed the mind from the strict letter of the Bible; secondly, the New Testament editions of Wetstein and Griesbach had shaken the readers' confidence in the inspired text; thirdly, Bengel and Crusius had modified the current notion of inspiration, insisting more on the active part of the inspired instruments than on their passive condition. The public was thus ready to appreciate Lessing's publication of the 'Fragments of Wolfenbüttel,' the work of his deceased friend Samuel Reimarus (d. 1768). The first part of this work published in 1774 inculcated tolerance for the Deists; the second part appearing in 1777 was a general attack on revelation; the third part published in 1778 was directed against Jesus and his apostles, practically representing them as so many deceivers.

But this attack on the reliability of the New Testament was too brutal to become popular. Hence Paulus (1761-1851) proposed a hypothesis which removed the supernatural element

from the New Testament as effectively as Reimarus had done, and at the same time saved the veracity of the inspired writers. In his 'Leben Jesu' (1828) he distinguishes two kinds of supernatural elements in the Gospels; one kind is carried into the Gospels by the interpreters against the intention of the inspired writers; another kind is really intended by the sacred text. The former is removed by a proper method of interpreting the Bible; the latter must be regarded as the result of the subjective impression of the evangelists. They were rude, uncultured fishermen, and judged of the extraordinary phenomena in the life of their Master in a way that was neither scientific nor rational. In brief, according to Paulus, the writers of the New Testament are no longer deceivers, but they were incompetents.

The reliability of the New Testament fared still worse in the 'Leben Jesu' published (1835, 1864, 1874) by Strauss (1808-71). He apparently saves both the veracity and the competency of the sacred writers, but he declares their work to be a mere collection of myths. The storm raised in Germany by this work is too well known to need further description.

Strauss had studied only the contents of the Gospels without paying due attention to the Gospels themselves. Ferdinand Christian Baur (1809-82) perceived this weak point in the work of his pupil, and endeavored to strengthen it. He believed that he had discovered the key to the history of early Christianity in the romance of the so-called Clementine Homilies. The opposition between Peter and Paul and their respective parties he traced back from these homilies into the books of the New Testament, in which the opposition between Petrinism and Paulinism was said to be either reflected or harmonized or again considered as past. Only the Apocalypse of John, the Epistles to the Galatians, to the Romans, and to the Corinthians were admitted as genuine; all the rest of the New Testament was pronounced pseudonymous, and relegated into the 2d century. Here we have the tenets of the Tübingen school.

**Anti-Tübingen Movement.**—Baur made several vital mistakes in his assumptions: (1) His fundamental thesis concerning the great opposition between Paul and the other apostles cannot be proved (cf. Weber, 'Katholik,' 1898, pp. 193 ff.; 1899, pp. 45 ff.). (2) Baur's preference for the four great Pauline Epistles was merely personal; subsequent negative criticism has not spared their genuineness (cf. Bruno Bauer, 'Kritik der paul. Briefe,' 1850-2; Steck, 'Der Galaterbrief nach seiner Echtheit untersucht,' 1888; Pierson, 'De Bergrede,' 1878). (3) Baur was wrong in his utter neglect of early Christian tradition. The testimony of a Clement of Rome, an Ignatius, a Justin, a Marcion, an Irenæus, and a Tertullian should not be set aside at the bidding of merely subjective considerations. Hilgenfeld, in his 'Historisch-kritische Einleitung in das Neue Testament' (1875), acknowledged the genuineness of several New Testament books rejected by Baur; Reuss, in his 'Geschichte der heil. Schriften d. N. T.' (1842), restores the origin of the whole New Testament, excepting 1 Pet., to the 1st century. Similar conclusions were reached by Ewald, B. Weiss, Hofmann, Schulze, Godet, Zahn, Harnack, and other writers. On the

whole, our most recent critics admit that early Christian tradition ought to be respected, and though the defenders of the general genuineness of the New Testament books encounter still strenuous opposition, as has been seen on the occasion of the publication of Zahn's 'Einleitung,' they are no longer charged with lack of scientific method.

**Syncretism.**—There are critics who maintain that the striving to understand Jesus as the originating source of Christianity must prove abortive. They believe that "the most enlightened scholarship of Europe and America has no standing before the bar of logic." The genesis of Christianity, we are told, "must be sought in the collective consciousness of the first Christian and immediately pre-Christian centuries; in the amalgamation of faiths when all the currents of philosophic and theosophic thought dashed together their waters in the vast basin of the Roman circummediterranean empire." But how can organic unity develop out of heterogeneity? How can concord develop out of discord and opposition? The material elements which compose the plant or the brute beast exist before either plant or beast begin to live; but who will imagine that a horse or a cow will be the result of the dashing together of their respective material elements? Moreover, Monsignor Batiffol ('Revue biblique,' January 1903) has shown that between 120 and 140 A.D. Marcion wrote a treatise proving that an opposition exists between the Law and the Gospel; at that early period therefore the Gospel was considered as possessing paramount authority. Again, Marcion appealed to Saint Paul in proof for the absolute newness and independence of Christianity. At Marcion's time therefore there existed a Canon of the New Testament books. And why should the faithful have esteemed the Gospels and the Pauline Epistles higher than the Epistles of an Ignatius, unless they were convinced that these canonical writings contained the exact teaching of the Master? The authority of Christ's word had preceded the authority of the canonical books.

**What is Christ?**—Higher critics distinguish between the Christ of history and the Christ of Christianity. Harnack, Wrede, and Staerk may be said to simply rob Christianity of its Christ. Schmiedel, O. Holtzmann, Bousset, and Schürer endeavor to link the Christ of history together with the Christ of Christianity, but their explanations are unsatisfactory. The Abbé Loisy, too, distinguishes a triple Christ: first, the views of Christ concerning himself; secondly, the faith of the early Christian community concerning Christ; thirdly, the Christology of the New Testament. And if you ask on what the faith of Christianity is based, if not on the facts of history, there will be as many different answers as there are writers. So that we rightly urge against our present-day higher critics the dilemma: Christ is either God, or what is He?

**Bibliography.**—A fairly complete list of the older literature belonging to this subject may be found in Reuss, 'History of the New Testament' (Vol. II., p. 367 f.); O. von Gebhardt adds to the preceding a fairly complete list of the pertinent literature down to about 1806 in his 'Urtext und Übersetzungen der Bibel,' which is a reprint of his articles on 'Bibel-

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text und Bibelübersetzungen,' contributed to the 'Realencyclopædie,' pp. 16, 54 ff. A reference to the contemporary literature may be found in the numbers of the 'Ecclesiastical Review' under the heading 'Recent Bible Study.' Besides, the reader may consult Rose, 'Studies on the Gospels' (authorized English translation by Mgr. Robert Fraser, 1904); Lagrange, 'La Méthode Historique' (Paris 1904); Lagrange, 'Etudes sur les Religions Sémitiques' (Paris 1905); Chauvin, 'La Bible depuis ses Origines jusqu'à nos jours' (Paris 1903); Chauvin, 'L'Enfance du Christ d'après les Traditions Juives et Chrétiennes' (Paris 1904); Chauvin, 'Le Procès de Jésus-Christ' (Paris 1904); Calmes, 'Comment se sont formés les Évangiles' (Paris 1904); Fonsegrive, 'L'Attitude du Catholique devant la Science' (Paris 1903); 'Jésus-Christ, Est-il resuscité' (Paris 1901); Chauvin, 'Histoire de l'Antéchrist' (Paris 1901); Chauvin, 'Au Golgotha' (Paris 1905); Méchineau, 'l'origine apostolique du Nouveau Testament' (Paris 1903); Méchineau, 'L' Autorité humaine des Livres Saints' (Paris 1903); Colomer, 'La Bible et les Théories Scientifiques' (Paris 1904); Saubin, 'La Synagogue Moderne' (Paris 1903); Vallet, 'Les Miracles de l'Évangile' (Paris 1905); Saubin, 'Le Dogme Chrétien dans la Religion Juive' (Paris 1900); Saubin, 'Le Talmud et la Synagogue Moderne' (Paris 1900); Paulus, 'Les Juifs et le Messie' (Paris 1904). ANTHONY J. MAAS, S.J.,  
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**New Testament Theology**, that branch of theological science which has for its peculiar task to state, arrange and compare the theological doctrines and conceptions found in the New Testament. While it might be combined with Old Testament theology under the name Biblical theology, yet the differences in dates, language, style and contents between the Old Testament and the New are such that their respective theologies have usually been treated separately, although their methods are necessarily identical. It is also possible to state the doctrinal teachings and theological conceptions of any individual author, and even those found in any single work of any author, and such contributions to Biblical theology have often proved exceedingly valuable; but the historic unity of the New Testament renders it practically important that the teachings and views of the various New Testament authors should be so presented and compared as to give but a single impression of the whole.

**Character and Relations.**—New Testament theology is strictly a historical science, neither attacking nor defending the conceptions which it finds, but merely stating, arranging and comparing them. As a historical science it is connected with Ecclesiastical History, and might be considered the first volume of the History of Christian Doctrine. But it demands such a mastery of the results of the sciences of Isagogics and Exegesis on which it depends, that it is usually associated rather with interpretation, of which it might be reckoned the crown. It also presupposes and builds upon Old Testament history and the history of the world in New Testament times, and in its turn it provides much material for Dogmatics.

**History.**—The name Biblical Theology, which had earlier been employed to designate such a system of dogmatics as was based upon the Scriptures rather than upon either creeds or reason, was first used in its modern sense by Gabler in 1787, since which time the science in its application both to the Old Testament and the New has gradually developed. The first American work in the sphere of New Testament theology was published in 1870, and the first lectures in any American theological school are said to have been given in 1883. Since then it has received a steadily increasing amount of attention.

**Difficulties.**—The task of the New Testament theologian presents peculiar difficulties. It is impossible for him to increase the amount of the material with which he deals, however helpful for supplementing or verifying his conclusions such increase might be. All expression of thought is defective, and most of all is this true in theology, where upon words derived from the earthly and the human is laid the burden of declaring the heavenly and the divine. Further, the teachings to be considered come in a form due to ancient ages, tongues, and conditions, and accordingly accurately and adequately to restate in modern form thoughts which have thus come down in ancient garb cannot be easy. Then, since with few exceptions the theological thoughts contained in the New Testament found expression solely for ends then immediately practical, it follows that the statements are often partial and incomplete, and the emphasis upon certain aspects of truth is only relative, and these statements must be read with constant reference to the thought of the age and the details of the local situation to which they belong. Hence only with difficulty can the incomplete expressions of practical religious thought be fitted together to reconstitute such systems of doctrine as may be credibly attributed to the various New Testament authors.

**Grouping of the Books.**—There is general agreement as to the grouping of the New Testament books according to the types of thought which they exemplify. The teaching of Jesus demands attention first, if not as a standard for the rest or as of superior authoritativeness, as at any rate prior in time to the other New Testament teachings and as presupposed by them. The records of Christ's teaching are necessarily subdivided into the Synoptic and Johannine reports. The second group of documents represents the type of Christian thought which developed among Christians of Hebrew descent, and consists of the first part of the book of Acts, the letters of James and Jude, the two letters of Peter (which, however, show that there had been a development considerably beyond the primitive conceptions current in the church), and such traces of apostolic or other early doctrine as may be noted in the Gospels. In the Pauline section the Epistles attributed to this Apostle fall naturally into four groups, which differ in theme and matter as well as in date and style. If any of these letters should not be held to be Pauline in origin, they are yet so distinctly in harmony with Paul's views that this would not change their place in the general classification, while the Epistle to the Hebrews is a natural pendant to the writings of Paul. The fourth

## NEW TESTAMENT THEOLOGY

group of New Testament writings consists of the books attributed to the Apostle John, consisting of his letters, of so much of the Fourth Gospel as is not the teaching of Christ and of the Revelation.

*Kingdom of Heaven.*—In the Synoptic reports Jesus began his teaching by echoing the proclamation of his forerunner, John the Baptist: "The kingdom of heaven is at hand." While from the beginning of this preaching he seems to have recognized that he himself was to be the head of the promised kingdom, yet his own conception of the character and work of the Messiah was so different from the popular conception, so much loftier and purer, that he could not present himself at once and unreservedly as the Coming King, for, had he immediately and unmistakably advanced his claim, political enthusiasm would have forestalled religious faith, and even on the part of true followers earthly ideals, expectations and plans would have obscured and neutralized heavenly, as, indeed, to some extent actually occurred in spite of caution and reserve. The name kingdom of heaven or of God, however, remained prominent throughout the teaching of Jesus, but in the latter part of it with an altered meaning. Convinced that he had nothing to hope from the leaders of the nation or the people whom they controlled for the kingdom of prophecy, which was intended to reach its spiritual ends through a local, national, political organization, Jesus necessarily substituted individual submission to the sovereignty of God, and retaining the name without the form, the kingdom which he strove to establish became in his teaching universal and spiritual.

*Repentance and Faith.*—While the state of individuals and society which he would establish thus took a new form in consequence of his rejection by his nation, the conditions of entrance, as well as the ultimate ends to be attained, remain unchanged. The first demand upon each and all is for repentance. As a morally transformed and thus fit nation should have met its King come at last, so only a soul turned from evil to good can receive the spiritual blessings which Jesus bestows. More and more clearly as antagonism gave renewed opportunity, Jesus denounced sin and demanded from all without exception penitence and reformation, although in serene consciousness of sinlessness he ever held himself apart from all confession of any evil on his own part.

*The Supreme Place of Christ.*—With repentance as a reversal of moral tendency must come acceptance of himself as Supreme Master and absolute submission to him. His demand for self-denial is a demand for complete self-abjuration; his invitation, "Come unto Me," is not only an invitation, but no less the presentation of himself to the world as the one fountain of spiritual blessing; to receive him he says is to receive God himself, and personal service to him is regarded as proof of sins forgiven; devotion beyond all other loves is required, and so absolutely supreme is the relation of the soul to him that on confession or denial of him he makes the issues of the future life to hinge. This relation is made still more significant by the few but clear and emphatic teachings as to his death, by virtue of which as a ransom salvation would be rendered possible for men.

*God's Love.*—The fourth element in the

teaching of Jesus which the Synoptists record relates to God. This teaching is almost never metaphysical, only religious and practical. The chief thought in it is God's love. This love, which exceeds that of any earthly father for his child, is shown in the rising of the sun on the evil and the good alike and the coming of the rain on both just and unjust, and in care for sparrows, ravens and lilies, and finds its crown of perfectness in kindness to the unworthy. The climax of this teaching appears in the parables about rescue of the lost, in the third of which, usually called the "Parable of the Prodigal Son," this tender love of God is so winningly presented that it has given a very common name for the love of God, so that all Christ's teaching is said by many to be dominated by the thought of God's "Fatherhood," a view which should be so held as to include the other conceptions of Jesus as to God's special relation of fatherhood to believers, and his unique fatherhood to Christ himself.

*Johannine Teaching of Jesus.*—In the Gospel of John the teaching of Jesus is presented with a superficial dissimilarity at first sight striking, but in essential consistency with the Synoptic reports. As the place of the ministry reported is largely the city of Jerusalem instead of the open country of Galilee, as we have often hostile Pharisees for interlocutors instead of disciples for reverent auditors, so of the four chief elements of the Synoptic teaching, the Kingdom, Repentance and Faith, his own unique supremacy and the fatherly Love of God, the kingdom is scarcely mentioned, repentance is ignored and faith given a different aspect, and the paternal kindness of God is much less emphasized, while Jesus insists even more upon his own pre-eminence and shows it in new lights.

*Deity of Christ.*—The two foci of the teaching reported in the Fourth Gospel are, as might be expected from the author's own statement of his purpose as stated at the end of his writing, the deity of Christ and the duty of Faith. All the discourses in the Gospel are selected with a view to showing Christ's self-revelation to the world on the one hand and to his disciples on the other. While his Messiahship is not here emphasized, there is presented instead a conception of a sonship based on a unique unity with God, combined with hints of pre-existence, suggestions and implications of divinity and, finally, a welcome by Jesus to the assertion of his deity.

*Faith.*—The proper relation on the part of his disciples, and, indeed, of all men, toward this personality who thus presents himself is not mere acceptance of statements about him and of truths relating to him, but further spiritual union with him by entering into relations to him, appropriation, in a word.

*Judaic Teaching.*—The earliest Apostolic teaching and the type of doctrine which seems long to have prevailed among the churches which were of Judaic origin and cast, was only to a very slight degree dogmatic, and brought no enlarged or corrected doctrines touching the nature of God or the character of men. Indeed, no New Testament authors ever approach these themes as if intending to communicate fresh truth, but rather to confirm and apply truth already commonly apprehended. The chief thought of the primitive church was the place and rank of Jesus, and here even the earliest teaching of the Apostles is developed in many

## NEW THEOLOGY—NEW-THOUGHT

respects beyond that of Jesus himself, a fact which is not surprising when it is remembered on the one hand that we cannot rightfully suppose that he exhausted the contents of his consciousness in even his frankest disclosures to his disciples, and on the other hand he himself promised that the guidance of the Spirit whom he would send from God would result in larger knowledge than his own instructions had brought. While the name of the kingdom is dropped at once and permanently out of use, at the same time the Messiahship of Jesus is asserted, and it is insisted upon that by his coming forth from the tomb re-embodied, which was the resurrection to which his Apostles testified, his Messiahship and Lordship were fully confirmed. While it was constantly recognized that Jesus was no less man than other men, he was regarded as distinguished from other men, not only by his character of unique holiness, but also by his Messianic rank which gave him universal sovereignty and Lordship, and, further, he was given the title Lord, which had been a familiar substitute for the most sacred of all the divine names. Theological discussions as to the nature, basis and conditions of salvation are not to be expected in such documents as represent Judaic Christianity, but it is plain that it was thought of as release alike from the consequences and the power of sin, provided, especially in the former aspect, by the death of Christ, and to be obtained by repentance.

*Pauline Teaching.*—The teachings of Paul are much fuller than those of the other Apostles, and in many places, owing to the doctrinal controversies which evoked them, they approach somewhat closely to dogmatic form, while such was the diversity of the occasions out of which the letters arose and of the situations of their first readers, that they cover nearly the whole field of Christian thought. Paul's conceptions of the nature and attributes of God, of his sovereignty and his love, and of the ruined condition of sinful men, while frequently brought out with great distinctness, were in no sense peculiar to himself. His special topics are, besides the rank of Christ, his saving work, the duty of man in relation to it, and the activity of the Holy Spirit in completing it. While Paul implies a general knowledge of the life and teachings of Jesus, he looked to Christ as far transcending in nature and rank what might be inferred from these facts. In Paul's mind the unique fact of the resurrection of Jesus at once certified to his unique nature and relation to God and opened to him the way to supreme exaltation and universal dominion which would become fully his when he should return in glory to earth. He shared the divine essence; in his activities before his birth of a woman he created the universe and continues to uphold it, and to him worship is rightfully paid. The life and especially the death of Jesus were a part of the divine plan for the rescue of men from the state into which their sin had brought them. The death of Christ was clearly set forth by Paul as provided in the love of God as a basis indispensably prerequisite for the favorable treatment which he gives to every penitent: the blood of Christ was to Paul the ransom and propitiation by virtue of which redemption and reconciliation are secured for men. Paul was led by controversy to insist with peculiar urgency that Divine forgiveness and favor are

conditioned on faith alone, that is, that salvation does not primarily depend on the behavior of a man, but on his acceptance of God's gracious gift, but while faith alone is the condition of entrance on the Christian's state, yet the Christian life in its ideal involves nothing less than the perfect performance of every duty, and this ideal is practically attained only by the aid and power of the Holy Spirit, whom he regards as possessing personal, divine attributes, who is imparted to every believer and permanently dwells in him.

*Teaching of the Epistle to the Hebrews.*—The letter to the Hebrews makes no contribution of special novelty to the theology of the New Testament. While somewhat unlike the thought of Paul in that it presents the Mosaic system as helpfully preparatory to Christianity which supersedes it, the views which it presents of the transcendent rank and sacrificial death of Christ are in fullest harmony with Paul's. That Christ is a "high priest," that is, a representative of men before God, and that faith is an unyielding grasp on the invisible, are thoughts which are peculiar to the author of this Epistle.

*Johannine Teaching.*—The teachings of John relate themselves proportionally more to God himself than those of any other New Testament teacher, but his conceptions of the deity, like theirs, are mainly dynamic and ethical, rather than metaphysical. His thought seems to sum itself up in three words, life, light and love, which suggest that God is the constant source of all power and joy; that he is spotlessly holy and tends unceasingly to manifest himself as such in and to his universe, and that his most central, essential and characteristic attribute is kindness and beneficence, unceasing and all-embracing. In the teaching of John the eternal Logos, or expression of God, became incarnate in Jesus, and thus presents God to men; and in turn by his death he became the "propitiation" in virtue of which forgiveness is promised on condition of penitence and confession. The privilege and duty of Christians is fellowship with God, that is, by refraining from all sin to share his spotless holiness.

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**New Theology, or New Divinity, The.**  
See EDWARDS, JONATHAN; PRESBYTERIANISM;  
NEW ENGLAND THEOLOGY.

**New-Thought** is an idealistic or metaphysical movement in this country. It began about 20 years ago. It is a direct successor of New England transcendentalism, but is much more practical and democratic. The older idealisms were seclusive, but this one is preached and practised on the highroads and carried into the minutiae of daily life, often assuming the forms of religion and philosophy. It boasts of being the greatest healer the world has yet seen

## NEW-THOUGHT

and scorns the idea of being mere speculation. It is claimed that New-Thought will not create any new religion or creed and that it will not formulate any new system of metaphysics. As regards religions, it is said by the representatives of New-Thought, that they are not desirable, because they are based on will, not on thought, and because they demand obedience. As regards metaphysics, no system is wanted, because life and thought cannot be confined in a system. The world needs illumination and freedom, not limitation.

The first apostles of New-Thought were P. P. Quimby of Portland, Maine, Dr. W. F. Evans, and their immediate disciples. The first preached it orally, the other by the pen. None of these, however, are its parents in any sense, nor are they quoted as authorities by any present-day followers or teachers. New-Thought is the modern expression of an inherent self-affirmation of the soul as old as the soul itself. New-Thought self-affirmation is intensely individualistic and has found its philosophy in Emerson's "Self-reliance." In the Emersonian extreme and in Tennyson's

Self-reverence, self-knowledge, self-control,  
These three alone lead life to sovereign power,  
—*Enone.*

may be found its First Principles. New-Thought people, however, identify the self with the "Oversoul" and commonly prefer to quote the Biblical "*I am* (that I am)" as their motto and foundation. The revealed secrets of the "*I am*" are to be read upon every page of their hundred and one serial publications. These "revelations" resound with mystic refrains of the Oriental *tat twam asi*, "That (namely the 'Universal Self') art Thou!" and they run into the high notes of Promethean self-deification and rebellion. "The Song of the Soul Victorious" is of freedom, of our being centres; of concentration and self-assertion, human divinity, ideal suggestion, the souls' prerogative to rule and of "vibrations" which are the redemptive forces of existence. In strong contrast and as a jarring note in this solemn and highflowing song one reads immediately afterward that the publisher does healing, "absent treatment, a specialty," at so much or so much per contract, if the reader promptly forwards the money.

New-Thought ontology teaches "oneness of life," that "all life is one," but the student searches in vain for any scholastic definition of these axiomatic teachings as also for the theological dogma "God is omniscient, omnipotent and omnipresent." This last, the omnipresence of God, is taught to the exclusion of all other attributes. The bearing of these two doctrines leave, however, no doubt about their being inherently pantheistic in character, and implying a pantheism in the direction of the Hegelian pan-logism. To New-Thought life, God and all other categorical terms are swallowed up by Mind or "the limitless self." New-Thought epistemology is in harmony therewith: "all knowledge is one," it declares with much force, but without argument, the popular understanding being that human knowledge is one with divine knowledge.

New-Thought is often confounded with Christian Science, but their difference can clearly be seen by their cosmology. The latter holds the Oriental doctrine that the world and its

things are illusory, products of "the mortal mind," but New-Thought asserts the reality of the world and considers it an expression of God, the two being related as cause and effect. The central doctrines of New-Thought lie in psychology. They consist in asserting the supremacy of mind over all other energies and in identifying it with the perennial stream of energy which permeates existence at large. Our mind is identical with the supreme mind, it makes us what we are and creates our conditions and environment; by inherent love it overcomes all hatred, malice and sickness; by inherent law it establishes itself as the world's law and by inherent order it rules everywhere. It keeps itself alive in love, law, and order by constant affirmation of itself: "*I am, that I am!*" In ethics, the New-Thought is of a decided optimistic tendency. Its programme is the Emersonian "don't bark against the bad, but chant the beauties of the good." Evil is not real, but only an imperfection which illumination dissolves. New-Thought is not iconoclastic, but fulfils the ends of creation in "peace and good will." If others do not know Reality and only worship "an unknown God," New-Thought people do not think it right to use violence or even persuasion; growth and experience will bring truth.

New-Thought is intensely practical. It professes to heal sickness and to remove the sting of death. Sickness is error and is cured by right and wholesome thinking, and death is but a transition, a "passing out" into another condition. If we always stood fast in right thinking we should never die, but simply transform ourselves.

New-Thought "circles of healing" are very common. They are found in every State in the Union, and in most cities followers of the cult can be found. It is estimated they exist by the million. The cult and its teachings have spread to Canada, England, and many places on the continent, especially France and Germany. The circles are not churches, but "bethels" or "houses of thought" for instruction and meditations. Services on Sunday usually begin with the singing of "Omnipresence, Omnipresence, Omnipresence, manifest Thyself in me!" and are followed by a few minutes of meditation for the concentration of mind, before the discourse is given. Speakers are chosen without regard to creed or race, etc. Their main qualification lies in their experience of oneness with the Great All. At the circles rooms are set apart for daily noon-hour meditation. In the rooms are also private classes for instruction, etc. The circles are maintained by voluntary contributions, but no teachers, excepting private class teachers, are paid.

New-Thought healers are many, but New-Thought teachers are many more. Experience has shown that no man or woman can heal for more than a very limited period of their lives. When they can heal no more, they teach others the method. The methods of healing run through the whole scale of impressing the "new" thought by suggestion, hypnotism, faith, or simple rationality. Healing is done also by "absent treatment" or telepathy.

A New-Thought convention was held in Chicago, 17-20 Nov. 1903, attended by many thousands. The following "progressive" declaration of principles was adopted:



## NEW ULM—NEW YEAR'S

1. The New-Thought is the new interpretation of universal and eternal Truth.

2. God—Universal Spirit, Mind, Principle—is omnipresent, omniscient, and omnipotent.

3. Man is the individual expression of God, possessing inherently and capable of manifesting all the aspects of God.

4. Man unfolds to a continuously expanding consciousness and manifestation of these aspects, through right thinking and right living.

5. The consciousness of harmony is Heaven, here and now; in the realization of which abide peace of mind and health of body.

6. The essentials of the New-Thought are suggested by the words—Unity, Co-operation, Freedom, Brotherhood, and Individuality.

C. H. A. BJERREGAARD,

*Librarian New York Public Library.*

**New Ulm**, Minn., city, county-seat of Brown County; on the Minnesota River, and on the Minneapolis & St. L. and the Chicago & N. W. R.R.'s; about 80 miles in direct line west by south of Saint Paul, and 25 miles west by north of Mankato. It was settled in 1857 by a German Land Company, incorporated in 1870, and chartered as a city in 1876. It was the scene of an Indian massacre in 1862. It is in a productive agricultural region in which there is considerable attention given to stock-raising. Its chief industrial establishments are flour mills, breweries, cigar factories, a creamery, a cooperage, machine-shops, a pottery, brick and lumber yards, and grain elevators. The mills have about 175 employees; the cigar factories, about 70; the breweries, 75; and the brick yards, 50. It has an extensive trade in farm products and live-stock. There are five churches, and the educational institutions are public and parish schools, Dr. Martin Luther College, Saint Michael's Academy, a public school library, and the Turnverein Library. The three banks have a combined capital of \$170,000, and the annual business is about \$15,000,000. The government, under a revised charter of 1891, is vested in a mayor, who holds office two years, and a council. The electric-light plant and the waterworks are owned and operated by the city. The majority of the inhabitants are German or of German descent. Pop. (1910) 5,648.

PHILIP LIESCH,  
*Editor 'Journal.'*

**New Westminster**, Canada, city in the Province of British Columbia, situated on the north bank of the Fraser River about 16 miles from its mouth in the Gulf of Georgia; on the line of the Canadian Pacific Railway, and the Great Northern Railway of which it is the northern terminus; 12 miles from Vancouver, and 75 miles from Victoria on the Island of Vancouver. It is connected with Vancouver by an electric railway. The climate is mild and pleasant. The Fraser River Bridge, connecting the city with United States lines by way of the Great Northern Railway and with the south bank of the Fraser and its farming, poultry-raising, fruit and vegetable interests, was opened in July, 1904. It cost \$1,000,000.

**Industries and Business Interests.**—The chief industries are lumbering, the salmon fisheries and their 44 canneries up the Fraser, oatmeal and woolen mills, machine and boiler

shops, foundry, furniture factory, fruit canning factory, cold storage works, carriage works, creameries, shingle mills, and car shops. The principal lines of shipment are fresh and canned salmon, lumber, rolled oats, grain, poultry and general supplies. Steamers run up the river about 50 miles several times a week, and daily down the river to Ladner and Steveston, and to Victoria three times a week. There is deep water all the way and large ships are loaded at the mills with lumber for all parts of the world. The exports of New Westminster in 1905 were \$2,753,713, the imports \$858,596, and the total customs revenue \$165,231.

**Institutions, Buildings, etc.**—The debt of the city is \$1,087,000, of which over one half was incurred in the construction of the waterworks system. This system supplies the city with water from a mountain lake (Coquitlam) 14 miles distant, by a steel main, and the water is equal to any in the world. The gross city assessment for 1905 was \$4,821,630, and the net taxable assessment was \$3,402,260. The rate of taxation was 25 mills. The city has 13 churches, 2 colleges, 4 public and 2 private schools, 1 high school, 2 hospitals, 1 provincial gaol, 1 penitentiary, 1 asylum for the insane, 3 banks. It owns the electric light and water systems and also contains the county buildings and the Supreme Court offices.

**History, Population, etc.**—The city was founded in 1859 by Colonel Moody, of the Royal Engineers, when the colony of British Columbia was established, and was selected as the first capital of the colony, with the early designation of Queenborough. In 1860 municipal government was established. In 1873 New Westminster was incorporated as a city. A serious drawback was the great fire in September 1898, which destroyed the whole business portion of the city, and a considerable portion of the residential section, with a loss of some \$3,000,000. The population is estimated (1906) at 8,000.

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**New Year's.** The observance of the first day of the year is of very ancient origin. The Romans on this day were accustomed to exchange greetings and make presents. New Year's under the Cæsars was a great source of profit to the emperor and quite burdensome to his subjects. The church at first prohibited Christians from having anything to do with it, but at last made the day a Christian festival. Before 1752 the year began on 25 March. The change in the calendar was made in that year for Great Britain by an act of parliament. In Persia the year is supposed to begin on 21 March, and the day is one of universal rejoicing. In Japan the new year is a season of much festivity and innocent mirth. Every portal is decorated, and each object of which the decoration is composed has a symbolic meaning. The usual form of the decoration is a green arch. Among the Chinese the day is the greatest festival of the year, and in France it is observed more than Christmas. A custom similar to that of making New Year's calls is the sending of cards to one's friends on the day. In this way one can keep up acquaintances

## NEW YORK

that might otherwise die out merely from lack of time for great sociability. After the restoration of the Bourbons it became fashionable in Paris to send bonbons on New Year's day, and in 1822 a thousand tons of them were sold in the two days preceding the festival.

The day was more or less observed among the American Indian tribes. The Moqui celebration, called *So-yal-u-na*, is largely a presentation of a singular and elaborate mythic drama, divided into two parts, in which offerings are made to effigies of the great plume headed serpent, the enemy of the sun, followed by a sun dance, in which the conflict between the sun and the inferior hostile gods is admirably portrayed by Moqui men personifying the various deities.

In the United States it has always been the custom of the Presidents to receive on New Year's day. In 1790, when New York was the seat of government, Washington held a reception between the hours of 12 and 3 and was visited by all the home and foreign dignitaries. He expressed the hope on that occasion that whatever change might take place in the manners and customs of the city the observance of New Year's day might never be given up. In New York and other cities there are services in many churches and receptions in many clubs and drawing rooms. The formal custom of receiving New Year's calls has nearly become obsolete in our larger cities, it having been superseded by the regular afternoon and informal evening receptions, to which gentlemen take more kindly than to the old-fashioned New Year's party. The good old Knickerbocker custom is still maintained by some families. Some give formal dinners, and in the country, carriage loads not infrequently go round from house to house making merry calls, picking up additions to the party and finally ending with supper at some hospitable house and in an evening with games, refreshed by apples, roast chestnuts, plum cake and sweet cider. The day was not observed in Colonial times with the formality which has marked its observation in later years. After the Colonies had adjusted business affairs to the new date, the first of January grew in importance and in course of time became a legal holiday. See *CALENDAR*.

**New York** (the "Empire State"), a State in the northeastern part of the United States; lying between lat.  $40^{\circ} 30'$  and  $45^{\circ} 1'$  N. and lon.  $71^{\circ} 50'$  and  $79^{\circ} 46'$  W.; bounded on the north by Lake Ontario, Saint Lawrence River, and Canada; on the east by Vermont, Massachusetts, and Connecticut; on the south by the Atlantic Ocean, New Jersey, and Pennsylvania; on the west by Pennsylvania, Lake Erie, and the Niagara River. Lake Ontario is west of the northern part of the State, and New Jersey is west of the southern part of the State. Lake Champlain is on the boundary between New York and Vermont. The extreme length of the State from north to south is 312 miles; and from east to west 326 miles, or 412 miles including Long Island. The area is 49,170 square miles, of which 1,550 square miles are water surface. The State contains 30,476,800 acres of land, of which 22,648,109 are in farms. It ranks in size the 26th among the States of the Union.

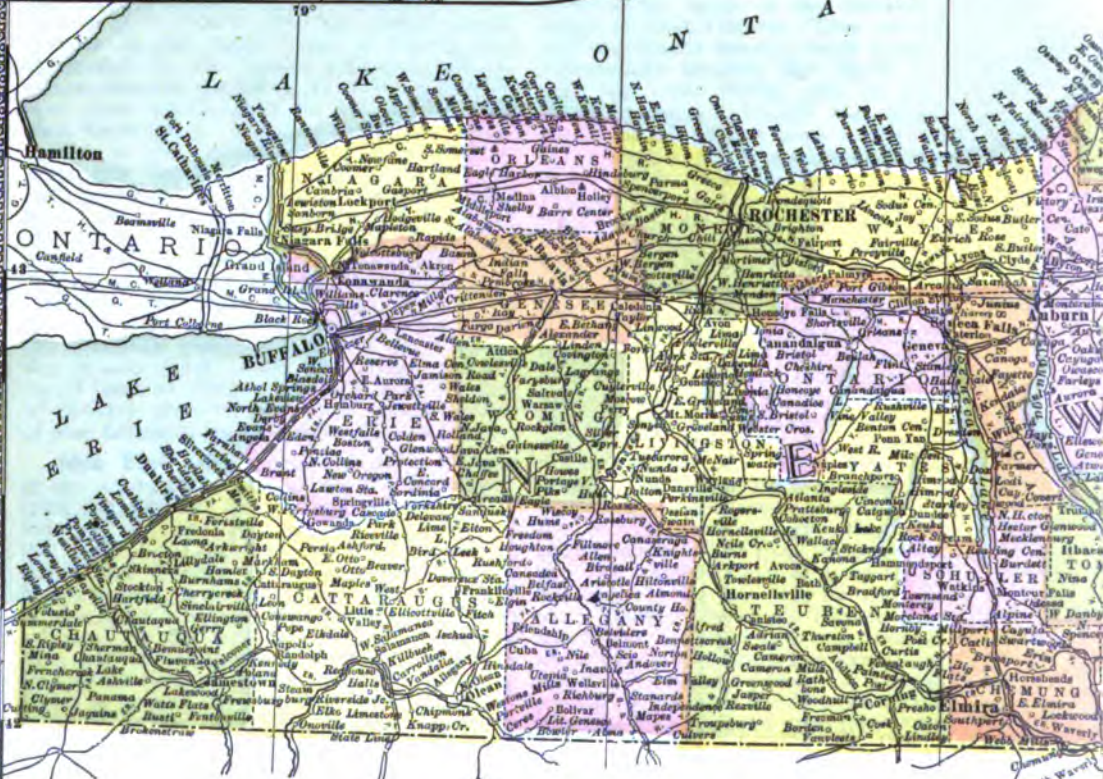
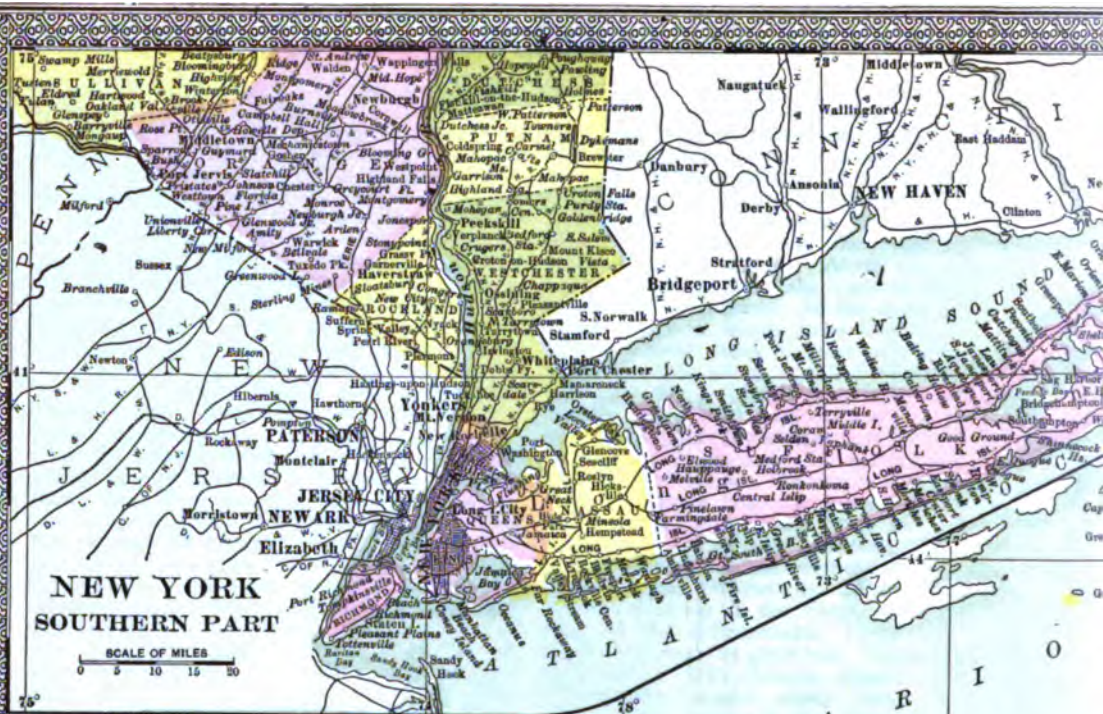
**Topography.**—About one half the boundary

of the State, exclusive of Long Island, is water. The chief inlet is New York Bay. Long Island, southeast of the mainland of the State, is separated from Connecticut by Long Island Sound; southeast of the mainland of the State, is separated from New Jersey by Staten Island Sound, Arthur Kill, and Newark Bay. Both these islands have inlets along the coast, some of which are good harbors. Along the shores of Lake Champlain and Lake Ontario there are a number of small inlets. In the Saint Lawrence River, where it leaves Lake Ontario, are numerous islands, many of them well wooded and beautiful. The group is called "The Thousand Islands." These islands are favorite summer resorts. Long Island on the south is a part of the coastal plain; the greater part low; the highest elevation is 382 feet. The eastern part of the State is mountainous, the ranges extending generally northeast and southwest. The central and western parts of the State are rolling or level land. The mountains belong to the Appalachian system. In the northeastern part of the State are the Adirondacks. Mount Marcy, the highest elevation in the State, 5,344 feet, is a peak of the Adirondacks. There are several peaks from 2,000 to 4,000 feet. These mountains are covered with forests, largely pine. The Adirondacks extend along Lake Champlain south to the valley of the Mohawk and west nearly to Lake Ontario. They are noted summer and health resorts; more people visit the Adirondacks annually for health or pleasure than any other outing place in the country. These mountains toward the south become ranges of hills which slope to the Mohawk in the east and to the lake shore plain on the west. South of the Mohawk Valley the land again rises to what is known as Catskill Mountains. Some of the peaks amid the Catskills are fully 3,000 feet high. Slide Mountain, the highest peak, is 4,205 feet above the sea. The Shawangunk Mountains, more a plateau, are south of the Catskills. The highest part of the plateau is in the west back from the Hudson from 1,000 to 2,000 feet. On the southeast and north is a limestone escarpment, Helderberg Mountain, which in some places attains a height of several hundred feet. In the western part of the State and parallel with Lake Ontario are two well defined terraces each about two hundred feet in height. The Lower Terrace, called Lake Ridge, extends from the Genesee River to the Niagara, and is from three to eight miles distant from Lake Ontario. This Lake Ridge marked at one time the southern shore of Lake Ontario, when the outlet of the lake was by way of the Mohawk Valley. The Upper Terrace, called Mountain Ridge, is about thirty miles inland, and extends east and west almost parallel with Lake Ridge. The highest part of the plain or plateau portion of the State is in Otsego County, where it attains the altitude of 2,300 feet. "Rock City," Allegany County, upon a summit 1,400 feet above the surrounding valleys, consists of a tract of 40 acres covered with rocks broken into layers forming streets and alleys.

**Hydrography.**—The waters of all the rivers of the State finally enter the Atlantic Ocean. They reach the ocean by way of the Saint Lawrence, Hudson, Susquehanna, Delaware, and Mississippi rivers. The great valleys of the State are the Hudson and Mohawk valleys,





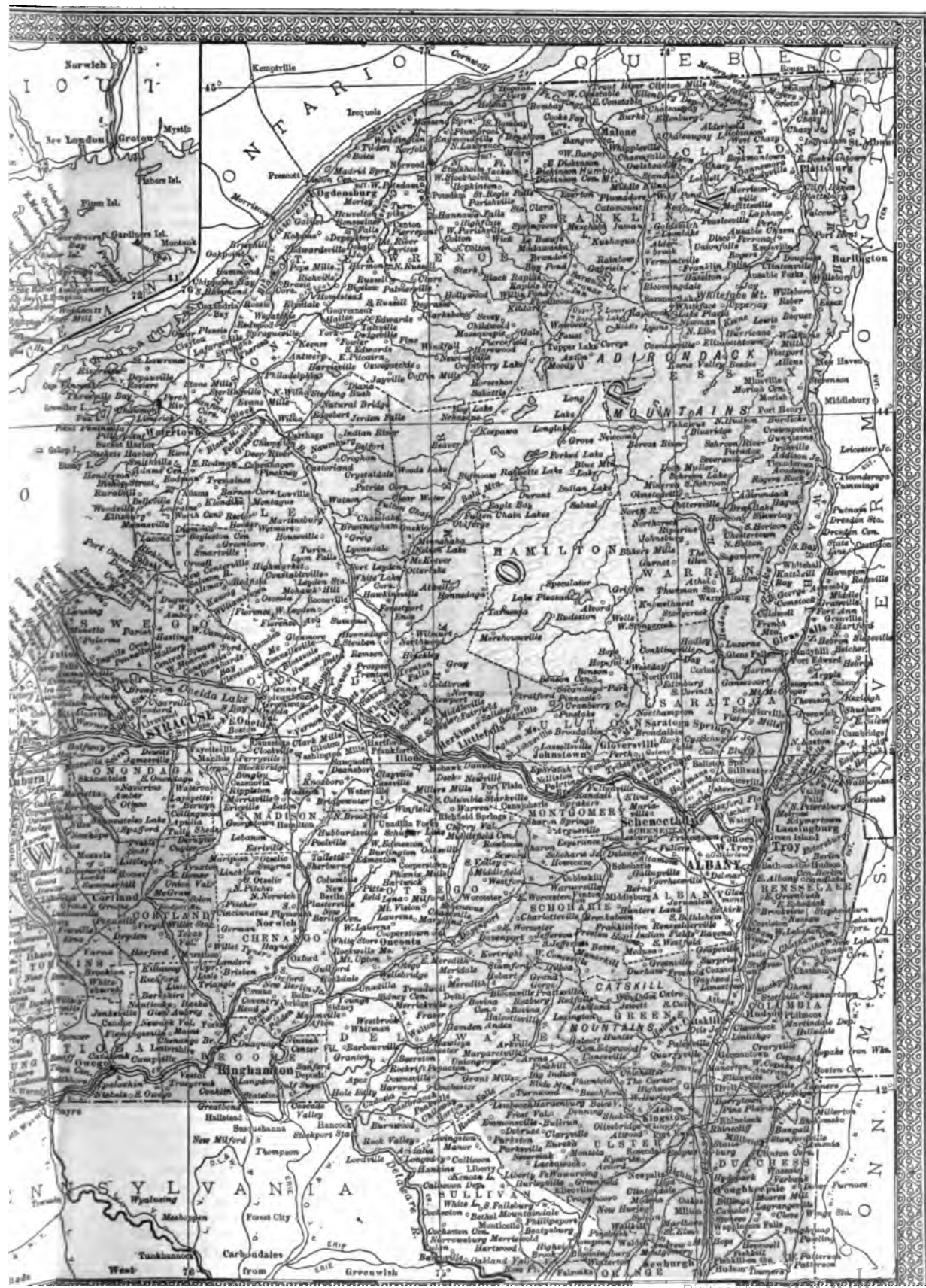


# NEW YORK

SCALE OF MILES  
0 10 20 30 40

Railroads.....  
Canals.....  
State Capitals shown thus: ⊙  
County Seats shown thus: ⊙









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which divide the State into three sections, one east of the Hudson and south of Lake Champlain, one in the northern part of the State, almost surrounded by water; Lake Champlain and the Hudson on the east, the Mohawk and Oswego rivers on the south and southwest, and Lake Ontario and the Saint Lawrence River on the west and north. The remaining section embraces the central and western parts of the State. The main stream lying wholly within the State is the Hudson River (q.v.), which with its tributaries, the largest being the Mohawk (q.v.), has been a great aid in the development of the commerce of the State. Through the Mohawk Valley the Erie Canal extends, and beyond to the Great Lakes, thus making a continuous waterway from the ocean north to the Mohawk and thence west across the State. The northern part of the State is drained by rivers which flow direct to the Saint Lawrence. The largest are the Black, Oswegatchie, Grasse, Racquette, Saint Regis, and Salmon. The Saranac enters the Saint Lawrence through Lake Champlain, and the Genesee and Oswego through Lake Ontario. The Susquehanna has its head waters in Otsego County, and the source of the Delaware is southeast of Otsego Lake. The Allegheny River, in the western part of the State, enters the Mississippi through the Ohio River. There are a number of falls and picturesque gorges in the Genesee River in the vicinity of the points where the stream breaks through the terraces. In the Adirondack region there are a number of beautiful lakes, the waters of which are remarkably clear. Lake George (q.v.), on the south slope of the mountains, is famous for its scenery and the points of historic interest surrounding it. Lake Champlain (q.v.), on the eastern boundary, together with Lake George, belong to the Saint Lawrence River basin. In the central part of the State are a number of lakes, long and narrow, which are called the Finger Lakes. The largest are Cayuga and Seneca, about 40 miles long, and from two to four miles wide. Oneida (q.v.) Lake is nearly circular in form. Lake Chautauqua, in the western part of the State, 1,212 feet above sea-level, is the highest navigable body of water east of the Rocky Mountains. The waters of this lake enter the Mississippi although it is only nine miles from Lake Erie. The most noted waterfalls and natural curiosities in the State are Niagara Falls, in Niagara River, 2,900 feet wide and 160 feet high; Portage Falls, in Genesee River, consisting of two falls, of 70 feet and 110 feet, and a series of rapids 150 feet; Genesee Falls, in Genesee River, at and below Rochester, consisting of three falls, of 96 feet, 25 feet and 84 feet, within a distance of two and a half miles; Trenton Falls, in West Canada Creek, Herkimer County, consisting of five cascades with a total fall of 200 feet in half a mile; Taughannock Falls, in Tompkins County, 230 feet; Chittenango Falls, in Chittenango Creek, Madison County, 136 feet; Lyons Falls, in Black River, Lewis County, flowing down an inclined plane 63 feet, at an angle of 60°; Kaaterskill Falls, Greene County, consisting of two falls, 175 feet and 85 feet; Baker's Falls, Washington County, consisting of a succession of falls and rapids, having a total descent of 76 feet in 60 rods; Cohoes Falls, in the Mohawk, near its mouth, with a total fall including rapids, of 103 feet; Glens Falls,

Warren County, 50 feet; High Falls, in the Hudson, Warren County, 60 feet; High Falls, Ulster County, 50 feet; the Ausable Falls, in Wilmington, Essex County, 100 feet; Enfield Falls, Tompkins County, consisting of a series of cascades with a total fall of 230 feet; Buttermilk Falls, Genesee County, 90 feet; and the falls in Fall Creek, Tompkins County, consisting of five falls with a total descent of over 500 feet in a mile. In East Canada Creek, about two and a half miles from its mouth, is a series of cascades and rapids having a total fall of 75 feet in 80 rods. Upon Stone Bridge Creek, Warren County, is a natural bridge 40 feet high, 80 rods broad, and 247 feet long. Dover Stone Church, Dutchess County, is a ravine 25 feet wide at the bottom, one to three feet wide at the top, about 40 feet long, and 40 to 50 feet high. Near Kyserike, Ulster County, is a cave which has been explored one and one half miles from its entrance. On Black River, at Lyons Falls, are the "Pictured Rocks"; and in Onondaga County are the "Cratean Lakes" and "Green Lakes."

**Geology.**—Nearly all the geological formations are present in New York. The Archæan is represented in the Adirondacks and the Highlands of the Hudson, by gneisses, granites, ancient crystalline and metamorphic rocks. Potsdam sandstone of a kind which denotes existence in the Cambrian age, is on the northeast and west of the Archæan area of the north. The lower Cambrian rock shows in a narrow strip extending south from the head of Lake Champlain and in the vicinity of Lake George. The palæozoic constitutes four fifths of the State and is represented by schists, slates, metamorphosed rocks in the east and by massive and hard sandstones in the Catskills. The palæozoic is represented by the Cambrian, Silurian, and Devonian periods. The Adirondacks, Highlands and lands west were above sea-level in the Silurian period, but the area of the State west of this uplift remained submerged until the Devonian period. The Triassic and Jurassic are represented by Newark sandstones and shales, in Rockland County; and the Pleistocene, by glacial drift, and lacustrine and estuarine clays cover a great part of the State. The Pleistocene ice-sheet covered the entire State and accounts for many of the peculiarities of the topography.

**Mineralogy.**—The latest available report gives as the principal mineral productions for the year: salt, 9,076,743 barrels, valued at \$2,136,738; gypsum, 58,890 short tons, valued at \$929,038; petroleum, 1,320,909 barrels, valued at \$1,708,926; fibrous talc, 63,500 short tons, valued at \$499,500; metallic paint, 2,500 short tons, valued at \$26,900; mortar colors, 2,350 short tons, valued at \$25,050; Portland cement, 465,832 barrels, valued at \$582,290; rock cement, 3,409,085 barrels, valued at \$2,045,451; natural gas, valued at \$363,367; limestone, 1,730,161; marble, \$332,518; slate, \$62,755; sandstone, \$1,467,496; granite, \$446,171; clay products, \$7,660,606; and iron, 441,485 long tons. Coal does not seem to exist in the State although found in large quantities not far south of the boundary. The Catskill and Potsdam sandstone, the Hudson River blue stone, and most of the limestone are valuable for building stone. The greatest deposits of hematite and magnetite are found in the

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Adirondack region. Rock salt is found south of Lake Ontario in the vicinity of Warsaw. The mineral springs exceed in value any other State except Wisconsin. The principal mineral and medicinal springs are the salt springs of Onondaga County, from which over 7,000,000 bushels of salt are annually received; Saratoga Springs; New Lebanon and Stockport, Columbia County; Massena, Saint Lawrence County; Richfield, Otsego County; Avon, Livingston County; Clifton, Ontario County; Sharon, Schoharie County; Chittenango, Madison County; and Alabama, Genesee County.

*Climate.*—The climate of the State, as a whole, is continental; but that of Manhattan Island, Long Island, and Staten Island is modified by the ocean. The average maximum temperature for the State is 100°, and the minimum is a little below zero. The Adirondack region, north of the highest point, or on the northern slope, is the coldest, having the longest and most severe winters. The mean temperature for January is, in the Adirondacks, 15°; on the coast 30°; in the western part 26°. The mean temperature for July, in the Adirondacks, is 64°; on the coast 70°, and in the western part 72°. The rainfall is copious, averaging for the eastern part of the State about 50 inches and for the western part 40 inches. The State is remarkably free from malarial conditions. The Adirondack region is noted for its freedom from conditions inducing tuberculosis.

*Flora.*—See UNITED STATES.

*Fauna.*—See UNITED STATES.

*Mining and Minerals.*—The chief products mined in New York State are salt, iron ore, sandstone, limestone, fire-clay, marble, granite and slate. The salt output of Michigan exceeded that of New York until 1893, since which year New York has ranked first as a salt-producing State. The average annual value from 1898 to 1910 was \$2,000,000. The annual output of iron ore is about \$1,103,817; for the same year the natural gas brought \$363,367; the sandstone \$1,467,496; the limestone, \$1,730,162; rock cement, \$2,045,451; clay products, \$8,073,769; the granite averages nearly \$400,000, and the marble the same. Gold in small quantities has been found in the Adirondack region, and natural gas near Lake Erie.

*Fisheries.*—The oyster fisheries are the most productive, representing over half the total value of the fishing industries of the State. Next in value are the menhaden, bluefish, and clams. The most valuable fisheries are on the coast of Long Island; Suffolk County ranks first. The shad and alewives are found in the Hudson; trout in the Adirondack lakes. The canned fish amounts to about \$196,869. The number of persons engaged in the fisheries has diminished from 1880. The State department having charge of the "Forest, Fish, and Game," is pursuing a scientific system, looking to the preservation of the forests, fish, and game of the State.

*Agriculture and Stock-raising.*—The soil of two thirds of the State is suitable for agriculture, only the rocky mountain area and some sand-belts are considered so unproductive as not to be classed with agricultural lands. All the other conditions for productive farming exist in a favorable degree. Until 1890 New York State ranked first in the value of its agricultural products; in that year some of the Western States

reached first place and the farm products of each of three of them were greater that year than those of New York. As the wheat and corn output of the West has increased, the farm products and farm improvements of New York State have decreased. The average of improved land has decreased since 1880, and the nature of the crops raised has varied. The Western wheat and corn in competition has caused the decrease of wheat and corn crops and an increase in the hay acreage. Corn for forage is increasing. The annual hay forage acreage is about half the total crop acreage of the State. The acreage, production, and value of important farm crops in New York State in 1910 were as follows: Corn, acreage, 680,000 acres; yield per acre, 38.3 bushels; production, 26,044,000 bushels; total farm value, \$16,408,000. Winter wheat, acreage, 444,000 acres; yield per acre, 23.7 bushels; production, 10,523,000 bushels; total farm value, \$10,102,000. Oats, acreage, 1,338,000 acres; yield per acre, 34.5 bushels; production, 46,161,000 bushels; total farm value, \$19,388,000. Barley, acreage, 78,000 acres; yield per acre, 28.3 bushels; production, 2,207,000 bushels; total farm value, \$1,545,000. Rye, acreage, 170,000 acres; yield per acre, 18.3 bushels; production, 3,111,000 bushels; total farm value, \$2,302,000. Potatoes, acreage, 438,000 acres; yield per acre, 102 bushels; production, 44,676,000 bushels; total farm value, \$21,444,000. Hay, acreage, 4,811,000 acres; yield per acre, 1.32 tons; production, 6,351,000 tons; total farm value, \$87,009,000. The area under tobacco is 6,000 acres; the yield about 7,050,000 pounds. Beet sugar is produced. The farm animals in 1910 comprised 717,000 horses, 4,000 mules, 1,771,000 milch cows, and 889,000 other cattle, 1,117,000 sheep, and 656,000 swine. The wool clip in 1908 yielded 5,100,000 pounds of wool, valued at \$1,158,000. High in importance of farm products is potatoes. New York takes first rank in the acreage devoted to potatoes, and in the quality of the crop it is not surpassed. Market gardening is of considerable importance. Nearly all the farm lands of Long Island and in the counties near New York city, on both sides of the Hudson, are devoted to market gardening. In 1850 the average size of farms was 112.1 acres and in 1909, 102 acres. The farms occupied by tenants is 24 per cent of the total number. The dairy products of the State are of great importance and great value. The State ranks first in the value of butter and milk, and among the first in the value of cheese. The amount produced is sometimes greater in some of the other States, but the quality in New York is the best and always brings the highest prices. The soil, vegetable, and climatic conditions, and the introduction of scientific methods in dairy farming, have greatly improved the quality of the dairy products. The milk sold yearly brings \$40,000,000; butter, \$10,000,000. The dairy products bring about 31 per cent of the total income from the farms. Along the Hudson, especially in Ulster County, and in the Genesee Valley and west, there are large fruit orchards, apples predominating. In the lake region in the central part of the State grapes flourish. Hops and tobacco are cultivated in the central part, and hops flourish in Franklin County. Floriculture is increasing in counties near the city markets.

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LOWER SARANAC LAKE, ADIRONDACK MOUNTAINS.



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Stock holdings were as follows for the years given:

	1910	1900
Dairy cows.....	1,508,672	1,501,608
Other cattle.....	812,921	1,094,781
Horses.....	590,150	628,439
Mules and asses.....	4,335	3,651
Sheep.....	929,547	984,516
Swine.....	665,027	676,639

**Forests and Lumbering.**—The original forests of the Adirondack region were composed chiefly of white pine, hemlock, and spruce; near the base of the northern slope of these mountains there were large forests of maple, birch, elm, white pine, basswood, hemlock, and spruce. The hard and soft woods were also found in the southern and western parts of the State. At one time New York ranked first among the States in lumbering interests. The only forests still standing in which there is much lumbering are in the northern part of the State. Spruce and hemlock now form the principal output for lumber. The pulp wood mills and paper mills are now using large quantities of timber, mostly spruce. The State owns 1,163,414 acres of Adirondack lands (State Reservation), and there are about 705,914 acres in private parks, and about 1,356,816 acres owned by individuals and companies for their own purposes. During the last decade efforts have been made to preserve the forests of the State. See **FORESTRY**.

**Manufactures.**—New York ranks first among the States in the value of manufactured products. The Erie Canal was a great aid in developing many of the manufacturing industries of the State. It gave an opportunity to bring the raw material at small cost to places where there was water-power, and then, still at low cost, to send the finished products to the markets. The rivers with their extensive water-power have continued to hold the large share of the manufacturing even during the period when steam was the main power in many places, and now the water-power is of greater importance in the development of electrical power. The enormous power of Niagara Falls is causing a remarkable increase in the output of manufactories, especially the aluminum, carborundum, and machinery made at the city of Niagara Falls. The great electrical plants of the State are increasing the manufacturing power; as at Schenectady, Mechanicville and other places on and near the Hudson River (q.v.); also at Massena (q.v.) near the Saint Lawrence River, and in many other parts of the State. The agricultural and mining interests of New York State are large and important, but her great manufacturing products are not only immense in amount, but of a wide and varied diversity. According to the 1910 United States census New York has held the foremost rank in manufacturing for many years, though, since 1849, when the first authoritative census of manufactures was taken, the proportion which the State has contributed to the total value of manufactured products in the entire United States has decreased somewhat. This proportion was 23.3 per cent in 1849 and only 16.3 per cent in 1909.

In 1849 the total value of the manufactured products of New York, including those of the neighborhood and hand industries, amounted to \$237,597,249, while in 1909, exclusive of the value of the products of the neighborhood and hand industries, it reached a total of \$3,369,490,-

192, or more than fourteen times that in 1849. During the same period the population of the State increased 194.2 per cent. In 1849 an average of 199,349 wage earners, representing 6.4 per cent of the total population were employed in manufactures, while in 1909 an average of 1,003,981 wage earners, or 11 per cent of the total population, were so engaged. During this period the gross value of products per capita of the total population of the State increased from \$77 to \$370.

In 1909 the State of New York had 44,935 manufacturing establishments, which gave employment to an average of 1,203,241 persons during the year and paid out \$743,263,000 in salaries and wages. Of the persons employed, 1,003,981 were wage earners. These establishments turned out products to the value of \$3,369,490,000, to produce materials costing \$1,856,904,000 were utilized. The value added by manufacture was thus \$1,512,586,000, which figure best represents the net wealth created by manufacturing operations during the year.

The following statistics of leading manufacturing industries (Census of 1910) will prove of interest. Clothing (men and women's)—Value of output for 1909, \$538,593,000; average number of wage earners, 189,467. The increase in the value of clothing manufactured in New York from 1904 to 1909 was \$177,636,000. Textiles—Value of output, \$185,780,000; average number of wage earners, 91,839. New York is the third State in the Union in the production of all textiles combined, of silk and silk goods, and of fur-felt hats, first in the manufacture of hosiery and knit goods and of carpets and rugs, other than rag, and second in that of cordage and twine and jute and linen goods. It ranks fifth in the production of woolen, worsted, and felt goods, and wool hats, and eleventh in that of cotton goods, including cotton small wares. Millinery and lace goods—Value of products, \$52,106,000. New York leads all other States in the Union in this industry. Fur goods—Value of products, \$41,301,000, constituting 73.8 per cent of the total of the United States in 1909. Printing and publishing—Value of products, \$216,946,000. New York leads all the States in this industry as a whole and in each of its branches. Foundry and machine shop products—Value of products, \$154,370,000, being the second State in the Union in this industry. Lumber and timber products (including logging operations, saw mills, planing mills and establishments manufacturing wooden boxes)—Value of products, \$72,530,000, giving New York second rank among the States in the lumber industry. Iron and steel works, rolling mills and blast furnaces—Value of products, \$66,153,000; average number of wage earners employed, 12,389. The State ranks fourth in this industry. Paper and wood pulp—Value of products, \$1,638,579. New York leads all other States in this industry. Boots and shoes—Value of products, \$48,186,000, giving the State third place among the States. Electrical machinery, etc.—Value of products, \$49,290,000. Tobacco manufactures—Value of products, \$76,662,000, leading all States. Slaughtering and meat packing—Value of products, \$127,130,000, ranking third in this industry. Butter, cheese and condensed milk—Value of products, \$42,458,000. New York is second in this industry, Wisconsin being first. Gas (illuminating

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and heating)—Value, \$42,347,000, the State holding first rank. Furnishing goods (men's)—Value of products, \$42,197,000. Patent medicines and compounds—New York leads all other States with a total output valued at \$37,343,000. Chemicals—Total value, \$35,346,000. Automobiles—Total value of products, \$30,980,000, more than seven times the amount reported for 1904. Precious metals—Value of products, \$30,825,000. Paint and varnish—Value of products, \$28,559,000, the largest of any of the States. Leather—New York occupies fifth place in this industry with products valued at \$27,642,000. Musical instruments—Total value of products, \$33,680,000, giving the State first place in this industry.

*Industrial Importance of Cities.*—The following table (U. S. Census) shows the average number of wage earners and the value of products in many cities and towns of the State:

CITY OR VILLAGE	Average number of wage earners. 1909	Value of products. 1909
New York City.....	554,002	\$2,029,692,576
<i>Boroughs:</i>		
Manhattan .....	385,358	1,388,408,005
Bronx .....	14,434	42,680,793
Brooklyn .....	123,883	417,222,770
Queens .....	23,891	151,680,180
Richmond .....	6,436	29,700,888
Buffalo .....	51,412	218,803,994
Rochester .....	39,108	112,676,215
Yonkers .....	12,711	59,333,865
Syracuse .....	18,148	49,434,615
Schenectady .....	14,931	38,164,699
Troy .....	20,030	37,979,986
Utica .....	13,153	31,199,261
Niagara Falls .....	6,089	28,651,913
Albany .....	9,861	22,825,702
Amsterdam .....	10,284	22,449,057
Binghamton .....	6,823	17,114,214
Auburn .....	6,497	15,961,022
Cohoes .....	8,209	14,830,722
Jamestown .....	6,780	14,720,240
Rome .....	3,633	14,423,437
Gloversville .....	5,741	14,170,682
Oswego .....	3,817	10,412,888
Olean .....	2,259	10,005,443
Newburgh .....	4,344	9,928,146
North Tonawanda.....	2,824	9,599,776
Poughkeepsie .....	3,299	9,150,964
Watertown .....	3,291	8,527,416
Little Falls .....	4,211	8,460,408
Lockport .....	2,138	8,168,450
Elmira .....	3,647	8,067,208
Peekskill .....	2,055	7,888,183
Fulton .....	2,799	7,867,114
Dunkirk .....	2,756	6,575,664
Johnstown .....	2,589	6,573,528
Cortland .....	2,356	6,394,624
Port Chester .....	2,122	6,243,951
Kingston .....	3,281	5,985,738
Geneva .....	1,526	5,153,925
Ogdensburg .....	1,259	4,947,976
Glens Falls .....	2,774	4,876,786
Middletown .....	1,733	4,658,240
Batavia .....	2,007	4,400,774
Hornell .....	2,183	3,647,630
Hudson .....	1,302	3,506,504
Mount Vernon .....	1,207	3,376,415
Plattsburg .....	1,049	3,137,523
Corning .....	2,074	3,050,410
Saratoga Springs .....	833	2,336,579
Rensselaer .....	763	2,296,089
Ithaca .....	873	1,919,968
New Rochelle .....	735	1,668,724
Watervliet .....	753	1,668,579
Ossining .....	356	1,328,925
White Plains .....	249	815,789

*Transportation and Commerce.*—The principal railroad systems crossing the State are the New York Central & Hudson River, the West Shore (New York, Chicago & Saint Louis),

the Erie, the Lehigh Valley, the New York, Ontario & Western, the Delaware, Lackawanna & Western, the Pennsylvania, and the Delaware & Hudson. The great trunk lines of the country make connections with all these roads. In 1900 there were 8,095 miles of railroad in the State. In the year 1899 the railroads of the State had one fourth of all the passenger carrying trade and one fifth of all the freight traffic of the United States. The Mohawk and Hudson was the first railroad in the State; it was completed and ready for operation in 1831, extended from Albany to Schenectady and was 17 miles long. About 11 years afterwards there was a railroad completed from Albany to Buffalo; next came the Erie, and then the road from New York city to Albany. In 1825 the Erie Canal (q.v.) was opened, and it has been in use in the carrying trade since that time. Other canals of the State are the Oswego, the Champlain and several branches. At the general election, in November 1903, the people voted an appropriation of \$101,000,000 to enlarge the Erie Canal. The State board of railroad commissioners have general supervision of railroads, especially with reference to public safety and convenience and to any violations of the law governing the railroads of New York. The total construction and equipment of all railroads, steam, surface, and elevated, within the State, is as follows: 1850, \$63,255,847.83; 1860, \$137,848,323.59; 1870, \$308,890,198.76; 1880, \$716,101,467.28; 1890, \$1,385,560,174.65; 1900, \$1,732,960,017.48. New York ranks first in the Union in foreign commerce. Its exports and imports include every variety of raw or manufactured material that enters the United States. New York City ranks as the third shipping port of the world, coming after London and Liverpool. The imports for the fiscal year ending 1910 amounted to the value of \$935,990,958 and the exports to the value of \$651,986,356. The exports consist largely of grain, flour, cotton, tobacco, apples, and other fruits, preserved provisions, cattle, and frozen meat. Most of the great railroad lines which bring merchandise from the west have their terminals on the New Jersey side of the harbor, but there are ample facilities for the transfer of goods to the docks on the eastern side by means of lighters and of barges which carry the loaded cars across. In New York State there are 8,600 miles of railroad, and 4,000 miles of electric railroad track. The canals of the State, used for commercial purposes, have a length of 566 miles, of which the Erie canal has 387 miles. The commerce between the places in New York State and other points in the Union is much greater than the foreign trade of the State.

*Banks.*—In 1782 the first bank in the State was incorporated as the Capital Bank of North America. The second bank was chartered in 1791, as the Bank of New York. The privilege to establish a bank or the granting of a bank charter became a political favor after 1804, when the law was passed making it necessary to have the sanction of the Legislature to establish a bank or issue currency. In 1812 there were 20 banks in the State, and in 1829, 48 banks. The charters were for a specified term of years, and various means were resorted to to secure renewals. It was deemed necessary to change the laws for the establishment and government



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of banks, and in 1829-30 a change as effected. The "safety fund" method was established. A board of bank commissioners was created, examinations and annual reports were established. (See BANKS.) The system of clearing houses now deemed essential, began in New York city. In 1854, the first year of trial for the new system, the exchange amounted to \$5,500,000,000. The total exchanges in the year 1910 were \$102,553,959,100. The conditions which govern commerce and finance make the clearing house of New York, practically, the clearing house of the United States.

The following statistics give valuable information regarding the growth of the banking system of the State:

per cent; excise tax, 17.5; and inheritance tax, 14 per cent. The first arrangement made for an income for State expenditures was the formation of a productive fund from the sale of public land. For a time the income derived from this general fund was sufficient for the support for the State government and the schools. In 1814 it was found necessary to increase the revenue, and this was done by forming another productive fund for school purposes. Later a direct tax was levied, but in 1826 this was discontinued. A system of public improvements was instituted in 1817, and a public debt of \$7,000,000 was incurred. The Erie Canal and other public improvements increased the debt. An effort was made to meet the new obligations by a

### BANKS, BANKING ASSOCIATIONS, AND INDIVIDUAL BANKERS.

	1840	1850	1860	1870	1880	1890	1900	1910*
Number.....	95	244	306	59	68	164	211	189
Capital.....	\$36,401,460	\$55,580,181	\$111,834,347	\$19,759,810	\$18,738,200	\$29,539,825	\$28,810,700	.....
Resources.....	86,987,548	.....	311,245,555	79,281,601	99,850,755	254,068,296	351,080,252	.....
Bank-note circulation.	15,235,056	27,511,787	31,759,127	439,303	37,553	8,004	.....	.....
Profits.....	4,085,596	9,232,473	13,316,468	7,384,290	8,058,180	21,146,448	28,308,438	.....
Deposits.....	16,796,218	54,467,682	116,190,466	46,447,905	61,795,773	177,109,131	238,194,498	\$35,619,699

Note.—Dec. 15, 1850. The 73 incorporated banks report capital, \$27,664,860; circulation, \$20,660,178.50. For years 1834 and 1840, banks reporting, both Safety Fund and not Safety Fund, to the commissioners were used.

\* State and private banks only.

### SAVINGS BANKS.

	1870	1880	1890	1900	1910
Number.....	136	128	124	128	142
Resources.....	\$245,991,777.00	\$400,944,380.00	\$667,865,396.40	\$1,037,869,160.34	.....
Deposits.....	230,749,408.00	353,629,657.00	574,669,972.59	922,081,596.26	\$1,526,935,581
No. of accounts open.....	712,109.00	953,707.00	1,477,819.00	2,036,016.00	\$2,886,910
Average account	344.03	370.79	388.86	452.88	529

### SAFE DEPOSIT COMPANIES.

	1890	1900
Resources.....	\$3,464,042.70	\$5,297,905.54

### TRUST AND MORTGAGE COMPANIES.

	1880	1890	1900	1910
Number.....	12	32	59	80
Assets or Resources.....	\$104,797,575.41	\$280,688,768.47	\$706,483,887.12	.....
Deposits.....	*91,304,510.62	211,320,275.05	640,837,146.35	\$66,964,224
Surplus.....	8,493,064.79	25,800,304.84	74,506,401.87	.....

\* Includes other liabilities.

### NATIONAL BANKS IN NEW YORK STATE.

	1870	1880	1890	1900	1910
Number.....	293	319	295	337	449
Capital.....	\$172,497,741.00	\$85,736,060.00	\$85,287,160.00	\$97,322,340.00	\$169,817,100
Circulation.....	63,229,183.00	16,818,677.00	46,504,807.00	51,355,465.00	.....
Individual Deposits.....	217,634,371.37	340,204,504.45	406,440,215.38	617,656,663.39	.....
Resources.....	523,245,031.87	693,426,072.82	720,213,916.79	1,322,249,445.22	.....

**Finance.**—The State income is derived mainly from a tax for general expenses and for schools, 29 per cent; corporation tax 25.5

sinking fund and by canal tolls and other means. The plan of loaning State credit to private corporations, principally railroads, was

begun in 1827. In 1842 the Erie Railroad failed with a large indebtedness to the State. Other smaller creditors failed also, and this new debt, together with that of the former, amounted to \$20,310,000. A tax was imposed sufficient to meet expenses, many public improvements were stopped, and outside debts were funded. The Constitution adopted in 1846 inserted clauses looking to a prevention of such conditions. No debt could be contracted except for war, and then popular sanction by a referendum was necessary. A general sinking fund and a canal sinking fund were created. The Constitution now in force retains the provision relative to popular sanction by a referendum. In the year 1895 the State debt was \$53,000,000. Of this amount \$30,000,000 was war bounty debt. In five years the debt was reduced to \$32,400,000; another decade saw it only \$8,988,000; and the whole debt was canceled in 1893. In 1900 a new debt was created for improvement of the Erie Canal. For the fiscal year 1910, the bonded debt was \$57,230,660. The income at present is derived from taxes on assessable property, fees from foreign corporations, licenses, taxes on certain public franchises, trusts, and banks. For the year 1910 the expenditures were \$57,422,290.96; and the revenues, \$59,872,316.73.

*Insurance Statistics.*—Following is a comparison of the business done in New York State by casualty, fidelity and surety, credit, real estate title and mortgage guarantee companies for the years ending January 1, 1909, and January 1, 1910:

	1909.	1910.
Number of companies.....	50	54
Assets.....	\$105,742,452	\$117,818,570
Unearned premiums.....	\$30,986,683	\$34,970,472
All other liabilities.....	23,463,524	27,078,997
Total liabilities.....	\$54,450,207	\$62,049,469
Capital stock.....	\$24,981,000	\$26,179,225
Surplus.....	26,311,245	29,589,876
Premiums.....	\$65,034,589	\$84,118,227
Other income.....	6,556,283	6,826,797
Total income.....	\$71,590,872	\$90,945,024
Claims paid.....	\$24,737,649	\$26,422,262
Dividends to stockholders....	2,302,074	3,005,066
Expenses.....	38,465,397	42,064,386
Total disbursements.....	\$65,505,120	\$71,491,714

Four general casualty insurance companies of other States were authorized by the department during the year ending 1 Jan. 1910, and the license of one was revoked.

*Government.*—The government of the State is administered in accordance with the provisions of the State Constitution. This Constitution may be amended by a majority vote of the House in two consecutive Legislatures and adopted by popular vote of the people. It may be revised by a Constitutional Convention, and the popular vote of the people. The last revision of the State Constitution was made in 1894, and went into effect 1 Jan. 1895. This Constitution provides for amendments and revisions as stated, and that the question of a Constitutional Convention and of a revision of the Constitution must be submitted to the general vote of the people every 20 years, or more frequently if so ordered by the Legislature. It provides also for a State census every 10 years.

All male citizens in New York State can vote, unless debarred by crimes against the law or of unsound mind. To be a citizen of New York State a man must have been a citizen 90 days, one year a resident of the State, four months a resident of the county, and 30 days a resident of the town or precinct. It is also required that voters to be entitled to vote must register, but registration for town and village elections cannot be made obligatory unless by express provision of law. In the cities the holding of party primaries are regulated by law; and the way in which votes shall be cast in all parts of the State is also regulated by law. The officers of the government are the executive, the members of the Legislature, the judiciary, and their subordinates.

*Executive.*—The governor of New York is elected biennially, by popular vote at a general election held throughout the State the first Tuesday after the first Monday in November. He appoints a superintendent of public works, a superintendent of banking, of insurance, of State prisons, a factory inspector, a commissioner of agriculture, commissioner of labor statistics, and an excise commissioner. He has a veto right which may be used to prevent appropriations or other legislative measures; but the Legislature may overrule the veto of the governor by a two-thirds vote of the members of the Senate and Assembly. He may pardon or reprieve criminals, and he may commute a sentence. He has power to make appointments other than those mentioned subject to approval by the Senate. The officials elected with the governor and for the same number of years are the lieutenant-governor, secretary of state, comptroller, treasurer, attorney-general, and state engineer and surveyor. The most important State boards or commissions are for health, lunacy, and charities, for forestry, railroads, quarantine, and tax equalization.

*Legislature.*—The Legislature is composed of a Senate of 51 members, who hold office two years; and an Assembly of 150 members, who hold office one year. The State is divided into senatorial and assembly districts. The senatorial districts, being less in number, have each a much greater population than each of the assembly districts. The lieutenant-governor is president of the Senate. The members of the Assembly elect their own presiding officer, who is called the Speaker. The populous counties are divided into two or more assembly districts. The members of the Legislature receive a salary of \$1,500 and mileage for each session. The Legislature holds its sessions in the State Capitol at Albany.

*Judiciary.*—The court of appeals is the highest court in the State. It consists of the chief justice and six associate justices, each chosen by a popular vote and for a term of 14 years. There are 102 judges belonging to the supreme court, each one of whom is chosen by popular vote for 14 years. The State is divided into nine judicial districts. Other courts provided for by law are county courts, city courts, surrogate's courts, justice's courts.

*Local Government.*—The incorporation of villages, chartering cities, and organization of counties is within the jurisdiction of the Legislature. The Legislature decides the limit of taxation and assessment for incorporated villages and cities, and restricts their power of

borrowing money. Any special legislation for a city or the cities of the State shall be submitted to the cities concerned, for their approval or rejection; but the Legislature may later overrule the veto of the city. Cities are divided, according to population, into three classes. The first class includes cities having a population of 250,000 or more; the second class includes cities having a population of over 50,000 and less than 250,000; the third class includes all other cities in the State.

**Militia.**—The National Guard, a portion of the State militia, is armed, equipped and ready for service at all times. It numbers 15,575 in 1910 (officers, and enlisted men). The Naval militia is also a part of the State militia and it also is ready for service at any time. It numbers 651 officers and enlisted men. There are four brigades of the National Guard. The headquarters are in Albany.

**Political Divisions.**—The State is divided into 61 counties. The county officers are judge, surrogate, sheriff, clerk, treasurer, district attorney, superintendent of the poor, and coroners. Each county, except New York, is divided into towns. The officers of the town are supervisor, clerk, commissioner of highways, assessors, constables. There are 42 cities (1910), the largest of which are: New York, pop. (1910) 4,766,883; Buffalo, 423,715; Rochester, 218,149; Syracuse, 137,249; Albany, 100,253; Troy, 76,813; Utica, 74,419; Schenectady, 72,826; Yonkers, 79,803. The government of the cities is vested in a mayor, board of aldermen, and the subordinate officials. Some cities are governed under a special charter. The villages are usually smaller than the cities, and the government is administered by a president and a board of village trustees. There are 43 congressional districts; the State sends 43 Representatives to Congress. There is a State Park or Reservation in the Adirondack Mountains, and one at Niagara Falls. There is a State Reservation for Indians on the Saint Lawrence River at the mouths of the Saint Regis and the Racquette rivers.

**Religion.**—All Christian denominations, and the Jews, have churches and large congregations throughout the State. Among Christian Churches, the Roman Catholic predominates in number of communicants and church attendance, in the cities, and Protestants in the smaller cities and country places. The Protestant denominations, according to number of communicants and attendance, rank as follows: Methodists, Presbyterians, Baptists, Protestant Episcopalians, Lutherans, and Congregationalists.

**Education.**—The system of education aims to furnish free schools for all the minors of the State, and in late years a system of education for adults has been organized and put into force with success. Education is compulsory between the ages of 7 and 16 years. The Annual Report of the Education Department (1911), gives the following statistics: *Attendance.*—Common elementary schools, 1,301,924; special elementary schools, 1,121; common high schools, 115,373; special high schools, 4,551; academies, 42,072; normal schools, 6,609; teachers training classes and schools, 4,068; universities, colleges, and professional schools, 33,792; special higher institutions, 4,703; private schools (estimated), 225,000; Indian schools (estimated), 7,848; evening schools, 125,086; trade and vocational schools, 1,013; total, 1,866,160. The number of

teachers employed in these schools were 52,075; the net value of property, \$345,009,101; and the total expenditures were \$74,423,825.14. The salaries of teachers in public schools amounted to \$34,801,604, the average annual salary being \$829, and the total number employed was 41,999.

Training for teachers is given in the State normal and training schools, one State normal college, and a large number of training classes located in different villages and cities, according to the needs of the sections asking for the establishment of such schools. Teachers' institutes are provided by the State, and a regular teaching-institute staff is maintained. (See SCHOOLS, COUNTY TRAINING.) The system of granting certificates or of licensing teachers is by uniform examinations. The Examination Department makes out the questions, assigns the time (for State examinations, the place), examines all the papers of the candidates, and decides who shall or shall not receive certificates. Many of the cities have special rules regarding other examinations, and also the establishment and maintenance of city training schools and classes. The local supervisor in a city is the superintendent of schools, in an assembly district, the school commissioner. The country sections are divided into school districts.

Cornell University (q.v.) is the only institution of collegiate grade in the State which awards scholarships by examinations. Columbia University (q.v.), founded under the auspices of the Protestant Episcopal Church, is the oldest institution of the kind in the State. Other colleges and universities are: New York University, New York city; College of the City of New York; Union College at Schenectady; Hamilton College, Clinton; Hobart College, Geneva; Colgate University, Hamilton; Saint John's, Saint Francis Xavier, Manhattan, and De la Salle colleges, New York city; colleges and universities in Buffalo, Syracuse, Rochester, and Elmira; Vassar (q.v.) is at Poughkeepsie; Barnard is affiliated with Columbia. There are 17 theological seminaries, 12 medical schools, 4 schools of pharmacy, 3 dental schools, 7 law schools. The State requires a certain degree of education before beginning the study of a profession, in a State school, and an examination is given at the end of the course to determine fitness and ability for graduation. The New York State Library (q.v.) claims to be the first public library in the State; it was founded in 1700. (See LIBRARIES; REGENTS, for "Traveling Libraries" and "Home Study Clubs.")

**Charitable Institutions.**—The governor and the Senate appoint the State boards of charities, corrections, and lunacy. The duties of the Board of Charities are to exercise an advisory supervision over charitable institutions, State and local, and over private institutions to which public charges have been committed. The institutions thus supervised number over 500, and the number of inmates in these institutions is about 60,000. The office of fiscal supervisor of State charities was created by ch. 252, Laws of 1902. He is appointed by the governor subject to confirmation by the Senate, and has the general supervision over the accounts and expenditures of the charitable and correctional institutions of the State, which include reformatories, industrial schools, institutions for the mentally defective, institutions for soldiers, for the blind, orphans, crippled, deformed, and treat-

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ment of tuberculosis. State charity institution buildings are contracted for under the supervision or by the approval of the governor, president of the State board of charities and the State comptroller. Among the present State institutions are houses of refuge for women at Albion and Hudson, reformatory for women at Bedford, soldiers' and sailors' home at Bath, Craig colony for epileptics at Sonyea, home for feeble-minded women at Newark, home for orphan Indian children at Iroquois, industrial school, Rochester, home for feeble-minded children, Syracuse, home for soldiers' orphans at Oxford, hospital for crippled and deformed children at Tarrytown, school for the blind at Batavia, hospital for cases of incipient pulmonary diseases at Raybrook. There are schools for the deaf and dumb, and several private institutions which receive State aid, but are not wholly supported by the State. There are supported annually in county almshouses, during a single year about 16,000 persons. In city and town almshouses fully 70,000 are supported. During the same time about 210,000 receive temporary relief. The State expenditures for the institutions supervised by the Board of Charities for a single year are nearly \$20,000,000.

The Board of Lunacy has supervision of the State insane hospitals. They are located at Binghamton, Buffalo, Dannemora, Flatbush, Gowanda, Kings Park, Matteawan, Middletown, Ogdensburg, Poughkeepsie, Rochester, Utica, Wards Island (New York city), Willard, Ovid. There are about 30,000 patients in these institutions. There are also 20 private institutions authorized by the State board to receive insane patients. The private institutions, partially under State supervision, have over 1,000 inmates. The cost for maintenance and operation of the State insane asylums or hospitals is about \$6,000,000.

**Penal Institutions.**—The State prisons are located at Ossining (Sing Sing), Auburn, Clinton (Dannemora). The State reformatories are at Elmira and Napanoch; one for women at Bedford. Houses of refuge are at Albion and Hudson. The State penitentiaries (county institutions for short term convicts) are in the counties of Albany, Clinton, Erie, Kings, Monroe, and New York. The counties which do not have penitentiaries arrange with the penitentiary of some other county for care and support of those sentenced to such a place of detention and punishment. The following statement shows the number of convicts in the several State prisons September 30 in each of the last six years:

Prison.	1905.	1906.	1907.	1908.	1909.	1910
Sing Sing.....	1,246	1,276	1,254	1,500	1,794	1,725
Auburn.....	1,145	1,083	1,139	1,246	1,292	1,417
Clinton.....	952	1,024	1,033	1,221	1,246	1,308
Women's.....	86	86	83	96	120	121
Matteawan.....	...	...	696	733	760	779
Dannemora.....	...	...	319	340	361	382

The following are the expenditures of the State prisons and hospitals for insane criminals for the year ending 30 Sept. 1910, for maintenance and ordinary repairs:

Sing Sing Prison.....	\$229,999.94
Auburn Prison.....	199,952.67
Clinton Prison.....	208,000.00
Women's Prison.....	24,500.00

Matteawan State Hospital.....	\$161,000.00
Dannemora State Hospital.....	90,721.82
<b>Total.....</b>	<b>\$914,173.53</b>

The abolition of the fee system in many of the counties, the more general application of the law of suspended sentence, the efforts to induce prisoners to reform, all have contributed to the decrease in the number of prison inmates. The system of instruction and training employed at Elmira is resulting in practical reforms. The parole law and the indeterminate sentence are being introduced into many other prisons. Capital punishment is still in force in the State; death by electricity, since 1880, has been substituted for hanging. Murder in the first degree is the only crime for which capital punishment is inflicted.

**Legislation.**—The most noteworthy recent legislative enactments, inspired for the most part by Governor Hughes, were: (1) a law prohibiting gambling at race tracks, passed in 1908; (2) a law authorizing additional railroad construction in New York City, passed in 1909; and (3) the creation of the Public Service Commission to exercise jurisdiction over all matters connected with public transportation. In 1910 an act was passed licensing and regulating private banking; the child-labor laws were amended by two acts so that now no minor under 16 years of age is permitted to work in any mercantile establishment, office, hotel, or as a messenger for more than 54 hours a week, nine hours a day, or between 7 at night and 8 in the morning. Among important acts of 1911 were the following: A law reapportioning the Congressional districts of the State; a direct State tax of \$6,072,763; a Direct Primary law was passed, providing for the direct nomination of all party candidates for public office except those voted for by the voters of the entire State, and also excepting town, ward and village officers and school directors and trustees. The candidates for State offices are to be nominated by State Conventions, but the delegates to these conventions are to be nominated by a direct vote.

**Population.**—Since 1820 the State has held first rank in population. The State receives the majority of the emigrants, of whom great numbers domicile. The number of foreign born, resident of the State in 1900, was 1,900,425, or nearly double the number in any other State. The population born in the State, but of foreign parents, was 2,415,845. There were the same year, 5,257 Indians, 7,170 Chinese, and 99,232 negroes. The urban population has increased more than the country. In the decade from 1890 to 1900, the rate of increase for the State was 21.2 per cent; the rate for the same year for the whole United States was 20.7 per cent. From 1900 to 1910 the rate of increase was 25.4. Pop. (1800) 589,051; (1810) 959,049; (1820) 1,372,111; (1830) 1,918,608; (1840) 2,428,921; (1850) 3,097,394; (1860) 3,880,735; (1870) 4,382,759; (1880) 5,082,871; (1890) 5,997,853; (1900) 7,268,012; (1910) 9,113,614.

**History.**—As the credit for the discovery of America belongs to one Italian, Christopher Columbus, the protégé of the far-seeing Queen Isabella of Spain, the credit for the discovery of New York is linked with the name of another

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Italian, Giovanni da Verrazano, the Florentine, in the service of Francis I. of France. Verrazano's ship, *La Dauphine*, which left Dieppe with several others in the autumn of 1523, unquestionably sailed by Sandy Hook in the middle of April 1524; proceeded as far as Raritan Bay, when by stress of weather Verrazano was forced to return to the open sea and continue his journey to the eastward. While Spain's discovery of the Continent antedated the French discovery of New York by forty-two years, the French navigators anticipated the Dutch on the same lines by eighty-five years. The English who were the last to arrive had no part in discovering any of the land which is now known as New York, although eventually they controlled the entire territory from Florida northward.

French enterprise early determined the importance commercially and politically of the New World, although handicapped by the fierce civil wars that raged from 1560 until the accession of Henry IV. in 1594. The year made memorable by the Edict of Nantes, 1598, which secured freedom of worship for the Protestants, the Marquis de la Roche obtained a commission to conquer Canada. His expedition was a lamentable failure. Five years later De Monts, who had been commissioned governor of Acadia, brought a number of colonists to Port Royal, subsequently called Annapolis by the English, but after two years of hardships the settlement was abandoned, the pioneers returning to France. De Monts' commission, which had been revoked, was revived by a company of French merchants who entrusted their fortunes to Samuel de Champlain, a man who by education, ability and perseverance was thoroughly competent to execute the responsible trust committed to him. What William Penn was to the English court, that was Champlain to the French king, Henry of Navarre. He was a soldier and sailor of fortune; a sincere and devoted Christian. To him must be accorded the imperishable honor of being the first man who set his foot in New York, as he was the first to teach religion to the Iroquois. In 1608 he founded the city of Quebec. The twelve years' truce which acknowledged the sovereignty and independence of the Netherlands by Philip II. after their long and sanguinary struggle for liberty marked the beginning of a historic era in the New World. On the evening of 29 July 1609, Champlain at the head of a band of Montagnais Indians encountered a war party of Iroquois on the west bank of Lake Champlain near Ticonderoga in Essex County. The next morning the unfortunate Iroquois were introduced violently to gunpowder and the white man's sway and the white man's way opened on the Western Hemisphere.

On 3 September following, Hendrik Hudson sailed into New York Bay on the eighty-ton ship *Half Moon*, with a crew of eighteen men, half English and half Dutch. Hudson's son accompanied him. Hudson was an Englishman who had twice essayed to reach far Cathay by the Northwest passage. The Dutch East India Company, which was the pioneer company to take advantage of discoveries of new territory and whose powers were elastic for the colonization of new empires and the government thereof, persuaded Hudson by the offer of a seductive

pecuniary inducement to lend his ability and fearlessness as an explorer to their enterprise. Accordingly on the fourth day of April 1609, he sailed from Amsterdam to seek for the third time the passage to India by the north. Again he was thwarted by gigantic icebergs and impassable seas of frozen ice which blocked his way. He changed his course to the westward, passed Greenland and Newfoundland, and sailed South until he descried the promontory of Cape Cod. He designated the region beyond it New Netherlands and for a long time the Dutch considered Cape Cod as the northeast boundary line of their territorial possessions. Continuing on his way, Hudson made Chesapeake Bay, but from letters which he had received from John Smith he understood his countrymen were in possession by right of discovery. He put about and headed to the north. He discovered Delaware Bay and river which he christened the Dutch South River. He fixed the southern boundary of New Netherlands from that point. On the second of September the Highlands of Navesink turned up over the horizon to the north. For a week Hudson loitered in the vicinity of Staten Island, which he named—an object of curiosity to the Indians, as his ship was of wonder to them. September twelfth Hudson sailed into the Upper Bay and de Groote River, which was called by the natives Shatemuc or Mohicanituck, subsequently the North River, in contradistinction to the South and the East, and eventually the Hudson River in honor of the distinguished explorer who discovered it. Hudson had explored the neighborhood from Sandy Hook to Amboy, indulged in amiable converse with the aborigines, and proceeded on his course in search of the Northwest passage to India by the way of the Hudson River. It was only after eleven days' sail when he reached the end of navigable waters that he was compelled reluctantly to abandon the undertaking. With a deep feeling of disappointment he turned the prow of the *Half Moon* to the southward. The reports of his success, however, were forwarded to Holland and stimulated further enterprises in the way of exploring and colonization, while Hudson was detained at Dartmouth, England, whither he had put in, owing to the threatened mutiny of his crew.

The following year the fur merchants of Holland despatched another vessel to the River of the Mountains, which for the time was called the Mauritius after Prince Maurice, the stadtholder. In 1611 Hendrik Christiaensen of Cleves sailed for the same destination and returned with two young Indians, the sons of a Manhattan chief. In 1612 three Amsterdam merchants, Hans Hongers, Paulus Pelgrom and Lambert Van Tweenhuysen, sent two ships, the *Fortune* and the *Tiger*, to open up trade along the Hudson River. The *Tiger* was accidentally burned at Manhattan Island and Adriaen Block, its commander, during the winter of 1613-14, built a new vessel, the *Onrest*, of eighteen tons, the first to be constructed on Manhattan Island.

Two settlements had already been started in what is now the State of New York; one by Christiaensen on Castle or Patroon's Island, on the west bank of the Hudson a mile or two South of the present Albany, called Fort Nassau; the second on Manhattan Island, covering the space midway between the Battery and Rec-

for Street on the west side of Broadway. Block in the meantime had sailed away to the eastward in the vessel he had built, discovered the island which bears his name, drew a map of all the region, and in consequence secured from the States-General a charter for the "New Netherlands Company" under which he enjoyed the monopoly of trade in that region until 1621, when the charter expired. In the latter year the Dutch West India Company came into existence, with a charter granted by the States-General of Holland. Two years later additions were made and an act of amplification given. Under this charter, which was to endure for 24 years, the company was permitted to trade with the West Indies, Africa, and "other places"; all other inhabitants of the United Netherlands were prohibited from trafficking with those countries. It was permitted to appoint governors and other officers; to determine the forms of administering justice, to make treaties and enact laws. Their first packet, the *New Netherland*—under the superintendence of Cornelis Jacobsen May—which plied her ocean trade for thirty years, brought in May 1624 over thirty families, eighteen of whom established a settlement at Fort Orange near Albany under Adriaen Joris. Two years later two ships loaded with emigrants, agricultural implements and domestic animals, left Holland for Manhattan Island, where the company had decided to erect a larger colony and their headquarters for New Netherlands. With the later colonists came the director-general, Peter Minuit, who the following year, 1626, purchased the island of Manhattan, containing 22,000 acres, from the Indians, for 60 guilders, or about 24 dollars.

The Colony "boomed" from the beginning and the stock of the West India Company sailed upward. Under "the Freedoms and Exemptions" act, adopted in 1628, the company gave authority to every person who should send over a colony of 50 souls above the age of 15 years, the title of "patroon" and the privilege of selecting tracts of land, except on Manhattan Island, eight miles in length along the river and as far inland as he pleased. It was obligatory for the patroon to be a member of the company. He was looked upon as a feudal prince. His possessions were exempt from taxation for ten years. The colonists were prohibited from manufacturing woolen, linen or cotton cloth. Under authority thus conferred Kiliaen Van Rensselaer, of Amsterdam, a diamond and pearl polisher, obtained, through Sebastian Jansen Krol, who had come out with Jan Huyck two years before as "a consoler of the sick," a tract of land 20 miles in length, from Baeren Island to Smacks Island, and 24 miles on either side of the river "stretching two days' journey into the interior," constituting the greater part of the present counties of Albany, Rensselaer and Columbia. Michael Pauw purchased from the Indians, Staten Island and the land upon which Jersey City and Bayonne are now built. With the development of the land and trade the inevitable occurred. The patroons practically became rivals of the West India Company in the fur trade. As the business of the latter diminished the wealth of the former expanded. Minuit, unable to readjust the differences, was recalled. For two years the office was vacant. It was then

filled by Wouter Van Twiller, a name that has been rendered synonymous with farce, burlesque, contempt and arrogance. Van Twiller had married a niece of Van Rensselaer and was an administrator of fair parts. He began the construction of a new fort; he built the first church edifice; a bakery, a brewery; he substituted brick for frame houses and new windmills for old. But his plans failed to mature because of his peculiar disposition. Dominie Bogardus, who had accompanied him to this country in the same ship, stigmatized him as "a child of the devil" and threatened to "shake" him "from the pulpit as would make him shudder." Van Twiller was removed under charges in 1637 and left office, as did many of his successors, with a fortune he had accumulated in service. His successor was William Kieft, a man of slender abilities and an embezzler, whose ten years of service were conspicuous for strife—with the English and with the Indians. Like Van Twiller, Kieft was deficient in the art of conciliation. His position was too big for him to handle. He gives a discouraging report of the condition in which he found the colony; farms were barren of tenants and of cultivation or thrown into common; trading vessels in poor shape; houses out of repair; only one saw-mill out of three was in operation; the fort at New Amsterdam, for whose repair his predecessor had received 4,172 guilders, lay in a state of dilapidation and the magazine was scarcely discoverable.

The first English flag seen in the vicinity of New York floated from the vessel commanded by Captain Samuel Argall, the roving buccaneer, who in 1612 had captured Pocahontas and held her as a hostage for the good behavior of her father. Argall had been despatched in 1614 on an extraordinary expedition by Sir Thomas Dale, governor of Virginia, to dispossess the unfortunate French people who had settled at Acadia. On his return from this successful buccaneering expedition, Argall paid his respects to the Dutch. He proceeded up the Hudson River to Albany, forced a surrender in the name of the English king, and sailed away. New Amsterdam likewise submitted to Argall's demand, but as soon as his vessels disappeared through the Narrows, the Dutch flag replaced the English ensign as had been done at Albany. In 1633, Jacobus Eelkens, the Dutch commissary at Fort Orange, brazenly attempted to establish English trade on the Hudson, but the scheme was crushed at its inception. The New Englanders were not satisfied with their possessions but coveted the more prosperous settlements of the Dutch to the westward. In 1638 Kieft had issued a prohibition against the English trading at Fort Good Hope near the present Hartford, which had been built in 1623. Shortly afterward, owing to the insolence of the English, an order in Council was issued, to strengthen the post, to maintain Dutch supremacy. We first hear of English settlers in New York in 1640 on Long Island. They had crossed the Sound from Connecticut. When the English audaciously confiscated land, near Fort Good Hope, which the Dutch had prepared for planting, and brutally chastised farmers who tried to plant, Kieft threw a detachment across the Sound in retaliation and dispersed an English settlement at Oyster Bay.

But Kieft found more trouble on his hands.



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The Indians of New Jersey betrayed signs of restlessness toward the governor of New Netherlands; he was threatened by the Swedes at the south; he realized the unfriendliness with which the cavaliers of Virginia, Maryland and Delaware regarded his colony; he could expect no favors from the Puritans on the east. At this crisis he unwisely provoked a quarrel with the Indians by demanding tribute in maize and fur on the ground that the Dutch had supported them in defense of their enemies. From the day Champlain introduced gunpowder to the savages on Lake Champlain, the red man of the forest had sedulously and successfully cultivated its acquaintance. So that when Kieft imprudently attempted to suppress the sale of guns and their accessories to the Indians, turbulence broke loose along the New York frontier. For three years the bloody strife continued, during which the Dutch in New Amsterdam were driven for protection under the guns of the fort and were reduced to much distress by the aggressive operations of the Manhattans, from the north, the Long Island Indians from the east and Delawares from the south and west. Roger Williams brought about an interview between Kieft and the sachems, but the peace which followed was of brief duration, for hostilities were resumed more savagely than ever before the end of the year. The Indians were bent upon a war of extermination of the whites. They felt their power, the force of their numbers and were thirsting for revenge. "When you first came to our shores you were destitute of food" exclaimed a Sachem before a treaty council. "We gave you our beans and our corn. We fed you with oysters and fish. And now for our recompense, you murder our people."

In 1643 "the first germ" of our Federal Constitution was planted by the formation of a league for self government and common defense by the colonies of Massachusetts, Plymouth, New Haven and Connecticut. For the time it was a powerful organization. To it, Kieft appealed in vain for aid, to carry on his Indian war. The confederacy was organized as much to make aggressions upon the thrifty Dutch as for defense against the Indians. Matters were going badly for Kieft until he solicited the support of Captain John Underhill, a valiant warrior, under whose skill and energy, an able-bodied force was raised, which encountered and defeated the Indians in several pitched battles. Peace was eventually assured in 1645 through the intervention of the Iroquois. Kieft failed to profit by the lesson. The act that led to his recall was the most infamous in Dutch Colonial annals. Without the slightest provocation, he crossed to the west bank of the Hudson, with the soldiers from the fort, a mob from the streets, and privateersmen and sailors from the harbor. Under cover of darkness he fell upon a band of peaceable and unsuspecting Indians at Pavonia and massacred men, women and children indiscriminately. Kieft left for home with a fortune. The ship was wrecked off the coast of Wales and governor and fortune went down together.

We now come to the much misrepresented and misunderstood Petrus Stuyvesant who arrived at New Amsterdam 27 May 1647, two years after his appointment as director-general. Stuyvesant was the son of a Friesland clergy-

man, had been educated to the army and navy as well, had lost a leg in the attack on the Portuguese island of Saint Martin and wore as a substitute a wooden one, that was girdled with silver bands. He was 45 years of age, overbearing in manner, autocratic in speech, prompt and decisive in action and a devout churchman. He conscientiously attempted to carry out the instructions that directed him to guard against aggressions on the colony's boundaries, to preserve peace with the Indians and to stimulate the growth of villages by the colonists. He found the colony much out of repair and the colonists next to demoralized. The dominating spirit that pervaded the West India Company and all that were connected with it, to the colonists themselves, was personal gain. New Amsterdam and Fort Orange or Aurania as it was sometimes called, were flooded with an aggregation of unscrupulous merchants and traders, who robbed the Indians on one side and their customers on the other. The example was established by succeeding directors-general and the plain people emulated that example. Stuyvesant inherited the turbulence and the dissatisfaction left by his predecessor and struggled with it courageously and with a hand so firm as to incite unpopularity among many whose plans he thwarted. A year before his arrival, Kieft had served notice on New England that the English "without provocation" had invaded New Netherlands, usurped divers places, done injuries and not given satisfaction, and that unless reparation were given "such means as God affords" shall be employed "manfully to redress ourselves." Stuyvesant for five years diligently attempted to establish pacificatory measures with the most powerful rivals of the Dutch, the English, and finally in 1650 by repairing personally to Hartford secured a treaty that fixed Oyster Bay, on Long Island, the western boundary of the New Englanders and Greenwich on the mainland.

In the meantime internecine quarrels aroused all the choler and tyranny in his nature. Without funds, the internal improvements he had in contemplation could not be carried out. He had seen how Kieft had quarreled with his "Eight Men," and as a concession for his taxation scheme he ordered an election, allowing the settlers in Manhattan, Brooklyn which had been established in 1645, Amersfoort and Pavonia, to elect 18 individuals from whom the governor and his council should select nine, who were to confer with the director on all measures tending "to promote the welfare of the commonalty and the country." Between the director and "the Nine," dissensions arose over finances. The latter refused to provide money for the repair of the fort, claiming the Company was responsible for that expense. They objected to Stuyvesant's management; complained of the heavy assessment levied upon trade, and when he peremptorily refused permission for the people to assemble, they made a house to house canvass. The director ordered delegates from the militia and "the Nine" ordered a journal to be kept by one of their number, Adriaen Van der Donck, and forwarded eventually to the home authorities. Stuyvesant blazing with wrath arrested the writer, threw him in prison on the charge of libeling the government and seized the papers. The controversy was carried

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with more or less acrimony on both sides to Holland; petitions were despatched across the sea complaining of the unreasonable and arbitrary exercise of power by the director. Stuyvesant in the meantime played into the hands of his enemies by his reduction of the Swedish possessions in Delaware. As the dissatisfaction of the Dutch burghers against him expanded, sympathy for him on the part of English settlers increased. He had established a weekly market in New York; in 1652 the city was incorporated; a year later the palisades were constructed to the north of the present Wall Street from the East to the North River; four years later citizenship was created and the city was surveyed, streets were regulated and named and several of them paved.

Under Stuyvesant's administration religion was encouraged and fostered. As early as 1626, Sebastian Jansen Krol and Jan Huyck who had originally sailed to the country as "consolers of the sick" are found, on the Sabbath, reading texts out of the Scripture and the creeds to persons who would attend. Two years later, in 1628, Michaelius, a minister of the Reformed Church, organized the first Dutch church in the New Netherlands with 50 communicants. In 1633 arrived Everardus Bogardus who sailed to this country on the same vessel with one governor, Van Twiller, to return home on the same vessel with another, Kieft, only to meet his fate at sea. His quarrels with both have become historical. Along in 1640 Dominie Johannes Megapolensis preached in the church which Kieft had built within the fort, before proceeding to his charge at Fort Orange, the present Albany. The Reverend Johannes Backerus, formerly a clergyman at Curaçoa, in 1647, superseded Dominie Bogardus in the pastoral charge of the Dutch church. New York had not escaped the wave of religious intolerance that had rolled over Europe during the preceding half century. An ordinance was adopted by the Dutch in 1640 that prohibited the exercise of all other religions except the "Reformed as it is at present preached and practised by public Authority" in the United Netherlands. The following year, however, this bigoted mandate was temporarily revoked. Father Jogues, the first Catholic missionary to New Netherlands, found that the colony harbored Catholics, English Puritans, Quakers, Lutherans, Anabaptists termed "Mnistes" (the Mennists or Mennonites) and Dutch Reformers. He reported an order was in force denying "public worship" to all but Calvinists. In 1654 the application of the Lutherans to erect a church in New Amsterdam was refused; "no doctrine shall be encouraged in the colony" but "the true reformed," ruled the director-general. The English settlements repudiated the teachings of Megapolensis who in 1649 had succeeded Backerus and who claimed the Classis of Amsterdam in Holland exercised spiritual jurisdiction over the colony. Quakers were arrested, beaten with ropes, were fined and imprisoned for their presumption in preaching their heresies.

The outbreak of war between Holland and England called in play all of Stuyvesant's great ability as an executive officer. The city was put in a state of defense. He had established the city of New Amsterdam and appointed the burgomasters, the schepens and fiscal. He now attempted to adjust affairs with New England

but in vain. Indian outbreaks excited the colony for several years. An uprising near New Netherlands was followed by massacres at Pavonia, Hoboken and Staten Island. In three days 100 Dutch colonists were killed, 150 were taken prisoners and a financial loss of 200,000 guilders, \$80,000, was sustained. Devastations at Esopus and the destruction of Wiltwyck were not the least disturbing problems he encountered in dealing with the Indians.

In the meantime the villages of Jamaica and New Haerlem had been created; a municipal court was established at Esopus, known as Wiltwyck; Arendt van Curler, long loved and trusted by the Indians as "Corlaer," had purchased the great flats at Schenectady and the colony was spreading forth like a blossoming plant, north, west and southwest of Albany.

The aggressions of the "malignant English" had been a source of annoyance to the Dutch for years. Cromwell at one time threatened to seize New Netherlands. In 1657 the commissioners of the United New England Colonies conceded Oyster Bay and Huntington to the jurisdiction of New Haven and three years later Huntington and Seatauket. In 1662 Connecticut laid claim to Westchester in spite of the provisional treaty. Charles II. had granted to the younger Winthrop, Massachusetts Bay, including Connecticut, and to his brother James, New Netherlands; the fact that a great part of this territory was not his to give, but belonged to the Dutch, was not included in the consideration in the least. About this time John Scott appeared on the scene. He produced orders for the stringent enforcement of the British navigation laws in the colonies, claimed that Long Island belonged to the Duke of York and proceeded to place the English Long Island towns under one organization, of which he was elected "president." When he attempted to seduce the Dutch towns he encountered the strong arm and the stubborn will of the director-general. The contest was acrimoniously conducted, was protracted and only ended by the appearance, 29 Aug. 1664, in the bay, of the English fleet under Colonel Richard Nicolls, who had been ordered by his royal master, the Duke, to take possession of the Dutch province, to reduce the Dutch to entire obedience, "to put them out of capacity of doing such mischief" as they had perpetrated in other quarters. It was repugnant and mortifying to Stuyvesant's courage to surrender his charge without firing a shot and, like a soldier of high spirit, he prepared to make determined resistance, in spite of the appeals of the city authorities and the clergy. "I would much rather be carried out dead," he exclaimed. Stuyvesant appealed in vain for help and for several days cleverly delayed the inevitable. He only yielded when Nicolls entered the harbor with his ships and an overpowering force, and he regretfully signed the articles of capitulation that had been agreed to by the magistrates. On 3 September, New Amsterdam became New York in honor of the Duke, the name of the fort was changed to James, also in honor of the Duke and three weeks later Fort Orange surrendered and was called Albany, in honor of the Duke. One of the inconsistencies conspicuous in the seizure of New Netherlands by the English is that at the time peace prevailed between England and Holland.

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The province received the name of New York. Its population was estimated from 6,000 to 10,000 souls. Municipal officers continued in power, but no more elections of magistrates were to be held by the people. Stuyvesant had insisted upon the guaranty of property and civil rights and freedom of worship—the Church of England Service to be held in the Dutch church at New York upon the termination of the service of the Reformed Church. Court proceedings were to follow English models. The province felt the direful effects of the next ten years of European wars. On 30 July 1673 with war under way between Holland on one side and France and England allied, a Dutch fleet under Cornelis Evertsen and Jacob Benckes suddenly appeared off Staten Island. Captain John Manning, in the absence of Governor Francis Lovelace, who had succeeded the Duke of York's personal representative, Colonel Nicolls, was not disposed to offer resistance, for his soldiers refused to fight and his own people spiked his guns. He surrendered, and the name of New York was temporarily changed, and that of the fort to "William Hendrick." Anthony Colve was proclaimed governor of the province. Under the treaty of 1674 New York was restored to the English. Sir Edmund Andros, an intelligent and wise officer, was appointed governor. In 1678 he describes the province as containing 24 towns or villages with 20 churches, specifies its products and exports as provisions, tar, furs and lumber, fixes the value of estates at £150,000, and the number of men capable of bearing arms at 2,000. Under his regime the navigation act was enforced; friendship with the Indians was cultivated to neutralize the influence of the French; a classis of the Reformed Church was established 1679 in New York to ordain ministers, and the governor endeavored to individualize New York as "the most English in sentiment of the American Colonies." Owing to disputes with New Jersey, complaints were filed against Andros with the home authorities. He was recalled, and exonerated; in 1688 he returned under a viceregal government to consolidate the Northern colonies. In the interim the office had been filled by Thomas Dongan, an Irish soldier, a Catholic and a discreet and conservative leader. He brought instructions to issue writs for an Assembly; and the people now saw in reality the culmination of hopes begun during Stuyvesant's time—the possibility of popular franchise. Accordingly 17 Oct. 1683 the representatives of the people of New York met for the first time in Assembly in New York city. The sessions continued until 3 November. It was ordained that Assemblies should convene triennially. In 1685 a charter was granted to New York and in 1686 to Albany. The hopes of the colonists for better things were dashed to the ground; the Assembly promised by the Charter of Liberties and Privileges never convened, for in February 1685, Charles II. died, his brother James the Duke ascended the throne and as James the King repudiated the acts of James the Duke; the charter was vetoed, and the Assembly abolished. Dongan had fallen under the royal displeasure by his failure to push forward the doctrines of the Church of Rome and was recalled.

Governor Andros was in arrest at Boston when the news arrived that James had been

dethroned and the lieutenant-governor, Francis Nicholson, lacked energy and decision for the crisis. People moreover distrusted him. Wild and exciting rumors were abroad in the land. Stories were circulated that the Catholics were to join hands with the French and overturn the existing order of things. Jacob Leisler was a prosperous merchant and captain of one of the train bands. He had been born at Frankfort and had seen service in the German army. The people turned to him. But the three councillors remained loyal to Nicholson. Leisler and his friends, fearful of the intrigues of the Catholics, proclaimed William of Orange, king. Ten members of the Assembly were appointed by Leisler as a committee of safety, and Leisler was declared by them to be governor. He carried his authority with a high hand. He usurped the functions of the lieutenant-governor and claimed the title; he opened letters addressed to Nicholson and arrested and imprisoned those who refused to obey him. When French invasion upon the destruction of Schenectady in 1689 was imminent, he displayed great energy, declared himself as the acting governor and forced recognition from Peter Schuyler, mayor of Albany, who had resisted the authority of Jacob Milborne, son-in-law of Leisler, whom he despatched up the Hudson with an armed force to subdue the thriving city. On the strife between Leisler on one side and Captain Richard Ingoldesby and Colonel Henry Sloughter, who had been appointed governor by William and Mary on the other; on Leisler's imprudent actions, it is not necessary to dwell. Eventually he was forced to submit. Pursued by vindictive enemies, he and Milborne died as martyrs. Sloughter, stupefied with rum, signed their death warrants and they were hanged near the site of the present *World* building in New York city 16 May 1691. Leisler was unquestionably a sincere but misguided man. Four years later Parliament reversed the attainder of Leisler and his associates. Lord Bellomont, afterward the enlightened governor of the province, declared that Leisler and his son-in-law were "not only murdered but barbarously murdered."

The history of the province for the following 84 years is conspicuous for brawls between the governor and the Assembly; for efforts to disseminate the doctrines of the Episcopal Church and to weaken the influence of the French and of the Catholic Church; to develop the land and the fur trade; to increase the growth of the towns, to preserve peace with the Indians; to cultivate privateering, and to wink at piracy; to reconcile differences with neighboring colonies. Much depended upon the sincerity, honesty and integrity of the governors. In the whole line of administrators from Nicolls to Tryon, under English rule not more than three governors can be cited in whom those three traits can be found. The governor's power was absolute. He not only made the laws but interpreted and executed them and when necessary unmade them. He usurped the prerogatives of the Assembly and of the courts; his Council were mere automatons who danced when he pulled the string. No act of the Assembly was placed on the statute book without his signature, and no decision of the court was valid until he, as chief justice, passed judgment; and in this respect he exercised powers denied to the king for his

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majesty, while permitted to sit on the king's bench, was prohibited from expressing judgment. Time and again the governor was threatened with removal; now and then charges were preferred against him and once the grand jury was urged to indict him for high treason. It is a sad commentary on the record, that every colonial governor who took office poor left office a wealthy man. There were three notable exceptions, the Irish earl, Lord Bellomont; Robert Hunter, the friend of Addison and Swift; and William Burnet, son of the bishop of Salisbury. The province had already become the haven of the persecuted of foreign countries. Between the years 1678 and 1696 the population of New York city had nearly doubled—from 3,400 to 6,000; that of the province had increased to nearly 30,000. The infamous practice of transporting felons to America and the degrading slave trade produced the most pernicious effects upon the cause of labor, stamping it with the stigma of disgrace in the one instance and involving a contraction of wages in the other.

Under General Hunter was tried the experiment of colonizing the Palatines. The scheme originated with English politicians who saw in it vast profit in developing the British commercial resources at the same time menacing French supremacy by strengthening the frontiers. Settlements were established first at Livingston's Manor, and subsequently along the Mohawk and in the Schoharie region. The experiment involved a loss of £100,000 to its projectors.

In 1732 occurred the memorable struggle between Rip Van Dam, the senior councillor, and Governor Cosby. The original cause was puerile and insignificant, and involved only a few pounds, a fraction of the salary Van Dam claimed during the 13 months he acted as governor; it culminated in one of the most glorious episodes in history and established the principles for the freedom of the press in this country for all time, through the courage of John Peter Zenger, editor, and the brilliant scholarship of Andrew Hamilton, his advocate in the famous trial for libel. Nine years later, the province was thrown into paroxysms of alarm over the so-called "Negro Plot." Several mysterious fires occurred in New York about the same time and the impression got abroad that negroes had kindled them with the ultimate determination of burning down the town. The only basis for the suspicion was the unsupported testimony of an ignorant immigrant woman who was bound out to the keeper of a disreputable resort. Every negro became a suspect and large rewards were offered for the conviction of an incendiary. Before the frenzy ended, under the judgment of the court, 13 unfortunates were burned to death, 18 were hanged and 70 transported.

For years, more or less apprehension prevailed over French invasion. The French wielded greater influence over the Indians through religion and princely presents. Settlements had been established at Oswego and at Niagara, and the governors were periodically at their wits' ends to protect them. November 1745, instigated by the French, a band of redskins rushed upon Saratoga—after Fort Hoosick had surrendered—killed the brother of Peter Schuyler and a number of others, spread destruction over the surrounding country

and carried off to Canada a number of captives. The Assembly of New York then followed the example set by Massachusetts and offered a bounty for Indian scalps. England had been remiss to a degree in neglecting even ordinary protection for its settlers. The home ministry permitted France to fortify and hold Crown Point, in spite of the protests from the province, whence war parties darted on their incursions of devastation, desolation and death.

Governor Clinton who succeeded Clarke as governor in 1743 was a sailor by profession and carried into the office all the old time martinetism of the quarter deck. He attempted to overcome England's handicap with her redskin neighbors. In August and September 1746 he held a council at Albany with the Iroquois with the intention of establishing an alliance and to counteract the marplotting of the French and the Jesuits. To strengthen the bonds of friendship and as an effective object lesson, Sir William Johnson, the English Indian agent for New York, appeared in the full garb of a savage, paint and all, and walked as an Indian chief at the head of the Mohawks. Owing to the illness of Governor Clinton, Cadwallader Colden explained to them that the French had been defeated at Annapolis; and that troops from Massachusetts, Connecticut and New Hampshire had captured Louisbourg. He informed them that the English king had sent troops enough to take Canada from the French and urged them to join the English in the undertaking. Oration were thereupon delivered, belts exchanged and presents divided; the Indians gorged and guzzled, warbled and danced, and agreed to join the English procession, and the northern part of the province was overrun with war parties who scalped and spattered blood, of male and female, young and old, the strong and the helpless, with unbridled ferocity. Governor Clinton accumulated a princely fortune during his ten years' service as governor and could well afford to quarrel with his Assembly, as several of his predecessors had done over the permanent support bill. His successor, Sir Danvers Osborne, hanged himself with his handkerchief 12 Sept. 1753, five days after his arrival in New York.

James DeLancey, lieutenant-governor, one of the best equipped men in the province for the position, succeeded him. He had been born in Albany and was the first governor to be born in the colony. He presided over the Congress at Albany in 1754 that contemplated union among the colonies, and opposed the plan. The treaty of Aix la Chapelle was a dead letter so far as the colonies were concerned, for French aggressions were more exasperating than ever. With the outbreak of the French and Indian war, Sir William Johnson, who had married the sister of the Indian chief Joseph Brant, and who never had commanded a company of troops on the field, was placed at the head of a force of 3,400, who marched to the northward. At Lake George on 8 Sept. 1755, occurred the battle which brought a baronetcy and a fortune to Johnson, deprived the officers who really won the victory of credit, led to the death of the celebrated Mohawk, Hendrick, and put to rout the French forces under the accomplished French general, Dieskau.

The main incidents in the French and Indian

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war were the capture of Fort Oswego by the French general, Montcalm, 14 August 1756; the surrender and massacre at Fort William Henry at Lake George on 9 August 1757 where Montcalm with 8,000 French and 2,000 Indians overcame the garrison of Colonel Monroe of 3,000 men; the surrender of Fort Frontenac to Col. John Bradstreet, and the surrender of Fort Niagara to the English 20 July 1759.

The birth of liberty in the State of New York practically occurred in the Colonial Convention to consider the Stamp Act, 7 Oct. 1765. With the accession of George III., 25 Oct. 1760, a new conflict broke out between the colonists and the authorities. All commissions expired with the sovereign. It was now contemplated to permit the judges to hold office only "during his Majesty's pleasure" instead of "during good behavior." Up to 31 March 1774, when the Boston Port Bill became a law, agitation throughout the provinces had become more and more pronounced and the people more and more unsettled. The battle of Golden Hill in New York city in 1770 had inflamed the public mind to the possibilities, and the representatives of the Crown in their constant collisions with the Sons of Liberty over the destruction of their liberty pole contributed naught in diminishing the drift of popular sentiment. On 23 May 1774, New York published its declaration of rights at France's Tavern in New York city. Two months later delegates were chosen for the first Continental Congress which convened in Philadelphia 17 Sept. 1774. On 1 May 1775 the committee of 100 was appointed as the successor of the New York Committee of Correspondence and the Committee on Inspection, respectively. The constitutional government had gone out of existence. The sentiment of the English party in New York city was naturally in sympathy with England; the old Dutch settlers, with their bitter remembrance of the 100 years of English rule, were almost unanimously in favor of revolution, but when the second Continental Congress convened in Philadelphia 10 May 1775, and the country had tasted all the horrors of war, there were members, especially from New York, who were still hopeful that the manifold grievances might be redressed. Grave events were happening with great rapidity. Fort Ticonderoga had been surprised and captured by Ethan Allen and Benedict Arnold 10 May; two days later Crown Point surrendered; within a week Arnold had captured St. Johns, Canada, and William Tryon the last English governor, who five years before had succeeded Lord Dunmore, sought refuge on the British gunboat Asia in the harbor of New York. Throughout the war New York was the real battle ground; topographically and strategically its position was recognized as of the utmost value to English and American as well. The English plan of campaign was based upon that of the French of 1689 and of Montcalm in 1757; namely, to break the back of the province by an invasion operating from the north and from the south along the valley of the Hudson. It was this objective that brought Burgoyne to America in the summer of 1777, when the American forces and American people were disheartened by successive defeats that included the battles of Long Island and the evacuation of New York city; the de-

feat at White Plains and surrender and massacre at Fort Washington. Three of the most important battles of the Revolution were fought on the soil of New York; that of Oriskany, 6 Aug. 1777, which practically shattered the right arm of Burgoyne, and that of Walloomsac, for many years mistakenly called Bennington, which shattered his left arm, both of which contributed immeasurably to the culminating defeat at Saratoga where the first British army in the history of England lay down its arms to an army composed of farmers.

Sir Henry Clinton had started from New York only too late to assist Burgoyne and had captured Forts Clinton and Montgomery in the Highlands of the Hudson 6 October, eleven days before the surrender. On 16 Oct. 1777, the British Colonel, Vaughan, ascended the Hudson to Kingston, which was burned without the slightest provocation, leaving a stigma upon the British name for pure vandalism that has never been effaced.

With Burgoyne's surrender, New York State was relieved of large standing armies, but was called upon to encounter straggling foes that menaced the frontiers and exposed towns to the close of the war. During the campaign of 1776 the safety of the people was indubitably secured by the tireless energy and countless resources of General Schuyler, but with his retirement from the Continental army as commander of the Northern District, the frontiers were left to shift to a large extent for themselves, and the Indians under Brant with the Tories under the blood-thirsty Butler swept over them with torch and scalping knife, meeting with feeble resistance until Congress and General Washington selected John Sullivan to destroy their crops and burn their villages from the Chemung to Niagara.

In October 1780 the Schoharie and Mohawk valleys were ravaged by a force of 800 Indians and Tories under Sir John Johnson. With the exception of the slight skirmish at Johnson Hall where Col. Marinus Willett put the enemy to rout, New York saw no more active fighting except sporadic brushes here and there between the militia and straggling bands of Indians.

The constitutional history of New York dates from the adoption of the Declaration of Independence. The Provincial Congress which had been elected in April met in the city of New York 14 May 1776. Before the convention adjourned the subject of independence was considered, and it was resolved that it was the sense of the Colony that the people desired to continue dependent upon Great Britain. As soon, however, as it was known that the Continental Congress recommended that each colony should establish its own form of government, a decided change of sentiment occurred in New York. When the newly elected convention assembled at White Plains 9 July 1776, the old regime had ceased to exist, and the New York Congress became "the convention of the representatives of the State of New York," the Declaration of Independence was speedily ratified, and a committee was selected of which John Jay was chairman, to draft a constitution for the State of New York. The enemy seriously interfered with the plans of the Convention. New York had been abandoned. The British men of war patrolled the harbor within seven miles of the place where the constitution framers were

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at work. Courts of law had been abolished, but the Convention ordered that all magistrates and civil officers who were affected toward independence should continue to exercise their duties and that processes hereafter must issue in the name of the people of the State of New York.

The draft of the constitution was submitted 12 March 1777. It was adopted 20 April and an election was ordered to be held in June. The sentiment of the constitution was decidedly English and its tone was aristocratic. It discredited the office of governor and it distrusted the people. Its abiding faith in the judiciary stands out in a strong light. It was liberal in its religious sentiments in that it permitted "the free exercise of religious profession and worship without discrimination or preference of all mankind." Slavery was still supported, although Gouverneur Morris and John Jay, who had been most instrumental in drafting the instrument, had attempted to move for its gradual obliteration. Its two weak features were the Council of Appointment, which was supposed to be a check upon the governor, and the Council of Revision, which was supposed to be a check upon the legislature. The Constitutional Convention of 1801 was called to determine the jurisdiction of the governor and the Council of Appointment in the matter of patronage. The decision of the Convention divided the responsibility equally between the four Senators who constituted the Council of Appointment and the governor. The two obnoxious councils, Revision and Appointment, were abolished by the constitution of 1821 which at the same time enlarged the area of the elective franchise by removing the property qualification. The weakness of the articles of confederation that had become apparent within a year of their adoption, threatened to shipwreck the country unless a strong form of government was organized and substituted in its place. General Washington and Alexander Hamilton had been agitating the necessity for a more powerful and cohesive instrument. On 17 Feb. 1787, the Assembly of New York adopted joint resolutions instructing the delegates of the State in Congress to move that a convention be held for the purpose of amending the Articles of Confederation so as "to render them adequate to the preservation and support of the Union."

Messrs. Robert Yates, John Lansing, Jr., and Alexander Hamilton were appointed delegates to the Federal constitutional convention which met in Philadelphia on the second Monday in May 1787, and which concluded its work 17 September. Messrs. Yates and Lansing withdrew and Hamilton was the only delegate from this State who signed the new constitution. The State convention to act upon the new constitution convened at Poughkeepsie 17 June, and adjourned 26 July. Ten of the thirteen States had ratified the Constitution—one more than the number necessary—with New York rebellious. George Clinton, governor of the State from 1777-95, appeared as the most resourceful opponent of the new Constitution and led the anti-federalist forces on the argument that New York was too powerful and wealthy to place herself on a par with States not her equal in income and resources. Alexander Hamilton and Robert R. Livingston were the strongest advocates of the new Constitution. In July notification was

officially made that Virginia and New Hampshire had approved the new Constitution, and the Federalists thereupon offered a resolution "that the Constitution be ratified in full confidence that the amendments proposed by this convention will be adopted." The resolution was adopted 30 to 27, eight members, including Governor Clinton, declining to vote. From this time forth two parties existed in the State of New York, the strict and the loose constructionists. The State of New York, owing to the failure of the legislature to agree in the choice of electors, lost its vote for President at the first election under the Federal Constitution.

The first political struggle in the State occurred in 1792 over the election for governor, when Governor Clinton by a fluke defeated John Jay. New York had experienced a number of disputes with her neighbors over boundary jurisdiction, especially with New Jersey, Vermont, New Hampshire and Massachusetts. New York was the first of the States to cede lands belonging to her to the United States for the encouragement and development of immigration. Within a space of seven years, 5,500,000 acres of land within the State had been thrown open to settlers, bringing to the State treasury \$1,030,433. Population fairly jumped, and it was necessary to create a number of new counties north and west of Albany. Internal improvements, turnpikes, and the development of waterways were constant subjects of discussion, and these subjects received an extraordinary stimulus in 1807 when Robert Fulton made the first trip with his steamboat on the Hudson River between New York and Albany. Three years later a commission was appointed to survey a route for a canal to Lake Erie. On 16 April 1816, commissioners of construction were appointed, and in 1817 commissioners of the canal fund were organized. As the construction of the canal proceeded a number of counties were opened to the right and left, and when the canal was completed in 1825, the population of the State had increased to 1,500,000.

Up to the outbreak of the second war with Great Britain, political struggles in New York were marked by fierce acrimony. Never was hostility more bitterly displayed and personal vituperation carried to greater excess. Hamilton had fallen in the duel with Burr, and from that hour dueling was banished as a social evil in the State of New York. The Clinton family, the venerable George, who had been a candidate for President against Madison, through the wire pulling of his brilliant nephew DeWitt Clinton, had been elected vice-president, and opposed the Federal administration of President Madison, whose New York representative seems to have been Governor Daniel D. Tompkins, an adroit politician and an able man.

At the opening of the presidential campaign of 1812, DeWitt Clinton aspired, through his Republican affiliations, for the presidential nomination and was nominated by a number of his friends in New York city; but on 18 May, President Madison was unanimously nominated. When Congress declared war in June, the President issued a patriotic proclamation which rallied to his support the entire Republican party and forced Clinton to abandon his own party and consort with the Federalists.

During the second war, Governor Tompkins.



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stands out as strong a character as George Clinton during the War of the Revolution, and like the first war governor of the State, he was selected, in honor of the distinguished services he had rendered to his party and State to serve as vice-president of the United States with James Monroe from 1817 to 1825, during "the era of good feeling."

Judge Tompkins presided over the Constitutional Convention of 1821. With the adoption of this Constitution, the Federalist party went out of existence for all time. New York State, and the new conservative element under the leadership of Martin Van Buren and DeWitt Clinton took charge of the party machinery.

It was during the term of DeWitt Clinton as governor that the anti-masonic craze swept the State and largely influenced national politics by the disappearance of William Morgan from Canada, 12 Sept. 1826. On 4 July 1827, by legislative enactment, slavery was abolished. Governor DeWitt Clinton died suddenly at Albany on 11 Feb. 1828 and his successor, Martin Van Buren, resigned in order to become secretary of state in the cabinet of President Jackson.

Under the administration of Enos T. Throop, who acted as governor until the regular election in 1830 when he was chosen governor, the manufacture of brick by machinery was begun in New York; the *Albany Evening Journal* was started by Thurlow Weed; the first omnibus was built and used in New York city; the Albany and Schenectady Railway was opened; chloroform was first obtained at Sacket Harbor; the Whig party was formed; the first horse street railway in the world was opened on Fourth Avenue, New York city; and the anti-slavery society of New York was organized. William L. Marcy who succeeded Mr. Throop, resigned his seat as United States Senator upon his election as governor, was a rabid partisan and rigid economist and favored moderate protection to home industry. He advocated internal improvements and after his re-election in 1834 recommended enlargement of the Erie canal and approved the construction of the Black River and Genesee Valley canals. The city of Albany now was recognized next to Washington as the political storm centre of the Union for her reputed "Albany Regency," which for years made and unmade candidates, controlled legislation and ruled the party and the State with arbitrary and at times high-handed methods. Mr. Van Buren was responsible for the breaking up of President Jackson's cabinet by his open recognition of Peggy O'Neil; his rejection by the United States Senate as minister to England by the casting vote of Vice-President Calhoun, would have led to a general dissolution of the Democratic party had it not been for the resolute individuality of President Jackson.

New York suffered with the rest of the country by the panic of 1837, which originally can be traced to the removal of the deposits from the United States Bank in 1833, and by the deluge of "shinplasters," as a consequence of legislative prohibition of bank bills under the denomination of five dollars. The election of President Van Buren was immediately followed by the financial disaster, a calamity which arrayed against the State and national administrations the entire banking and financial institutions

of the entire country; that opened the way to the election of William H. Seward, the first Whig governor, in 1838, and two years later of William Henry Harrison on the "Tippecanoe and Tyler too" platform, the first Whig President of the United States. So demoralized were the finances that in 1841 the State was unable to borrow money to pay contractors upon the canals, and in 1842 a law was passed suspending work and providing for the raising of money by taxation. The Erie railway which secured a charter in 1832, which obtained from the legislature in 1836 a loan of \$3,000,000 and which by 1840 was completed as far as Goshen, was abandoned, the company made an assignment, and it was not until 1851 that the road was completed. Public works of all character were suspended and discouragement and depression were paramount.

During the next decade through the administrations of Governors Bouck, Silas Wright, Hamilton Fish and Washington Hunt, the antirent troubles were a very prominent disturbing factor in the State, and the question of slavery throughout the country began to assume proportions that pointed inevitably to war. The Constitutional Convention of 1846 was held at the height of the demand of popular sentiment for the limitation of the power of the governor and of the legislature and for the extension of the elective franchise. The Convention abolished the court of chancery, limited the power of the legislature over the revenues, stripped the legislature of the power to appoint general administrative officers of the State, and substituted general laws for the organization of business corporations instead of special legislation. In consequence a great impetus was given to the organization of banking, telegraph, insurance and railway companies to conform with the prodigiously expanding institutions of the State.

The split in the Democratic party, owing to the slavery problem, and the rapid growth of the Free Soil movement in New York, decided the election of General Taylor for President in 1848 and the election of Hamilton Fish as governor. The Whig party in turn was torn by dissensions in 1850 when Washington Hunt was elected governor over Horatio Seymour, and two years later when Seymour carried the election, was a natural consequence of the condemnation of the people for the Compromise measures in Congress. The Whig party ceased to exist as a factor after 1852. With the exception of the slight disturbances in the State over temperance legislation, national politics monopolized the attention of politicians until 1857. In the meantime the American party and the Republican party came into existence. The agitations in Kansas and Nebraska, with the reckless threats of the Southern leaders in Congress, opened the eyes of the most sagacious to the possibilities of war between the sections of the country. The panic of 1857 produced a temporary set-back to the rapidly growing prosperity of this State. When Edwin D. Morgan was elected governor in 1858, the most active parties were the Democrats, the Americans, the Abolitionists and the Republicans. Governor Morgan was re-elected in 1860 on the same ticket with Abraham Lincoln, who had defeated New York's favorite Senator, William Henry Seward,

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for the nomination for President at the Chicago convention.

On 12 April 1861 Fort Sumter in Charleston Harbor was attacked. On the 15th President Lincoln issued a call for 75,000 volunteers to defend the life of the Union. The Union Defense Committee of New York was organized that evening. Within ten days 7,334 men were on their way to Washington—the first regiment to respond to the call was the 7th New York, Colonel Leffert's. April 16th the legislature created a State board to enlist and equip 30,000 men. Eighty-two companies were accepted in one week. The first volunteer regiment left the State 29 April and the last 12 July. Governor Morgan who had been commissioned major general, was placed in command of a separate military department of the United States constituting the State of New York. During the four years of war, New York furnished 448,850 men, or one sixth of the total. This proportion holds good in the total losses and casualties. For organizing, uniforming, equipping, substituting and transporting troops, the State expended \$3,745,554.98; for bounties \$50,657,406; for relief \$500,773; or in aggregate, all things considered in the way of official outlay on the authority of the State, \$57,569,082.56. The sentiment of New York State placed the responsibility for the war upon the Democratic party, although at the outbreak, thousands upon thousands of Democrats who had stood shoulder to shoulder with the political fire-eaters of the South, joined the Republican ranks, a very large proportion obtaining commissions as officers in the army of volunteers which had been hurriedly thrown together. The succession of Union disasters, however, and the declaration of the Emancipation Proclamation by President Lincoln, had created a feeling of distrust, uncertainty and doubt, which led in 1862 to the overthrow of the Republican party and the election of Horatio Seymour as governor over General James S. Wadsworth, an estimable gentleman and valiant soldier. The rebuke administered was not so much in the nature of a protest against the war as it was a protest against the conduct of the war. The success of the Democrats led to a marked decrease in the number of enlistments, which forced the national government to resort to the expedient of drafts. The demagogical utterances of Governor Seymour had led the reckless and lawless throughout the State to believe his hostility to the conduct of the war included protection for them in the commitment of criminal acts. Unprotected by the transfer of its local militia to Pennsylvania after the battle of Gettysburg, New York city was now exposed for several days to mob law in the enforcement of the drafting, unequalled in the history of the country. Governor Seymour directly repaired to the metropolis, began a conciliatory speech by addressing the mob as "my friends," but eventually warned them by proclamation. The insurrection was only subdued by the return of the local military organizations.

Governor Reuben E. Fenton succeeded Governor Seymour in 1864, having been elected on the same ticket which returned Abraham Lincoln to the White House for his second term as President of the Nation. With the return of peace the country was confronted with the difficult problem of assimilating the hundreds of

thousands of soldiers who were now seeking employment in civil life and ordinary avocations. One of the first propositions considered by the people during the second term of Governor Fenton, was the agitation for the convention to revise the constitution, which culminated in the Constitutional Convention of 1867 that assembled at Albany on 4 June. The Honorable William A. Wheeler of Malone, afterward vice-president of the United States, was president of the convention which ended its labors on 28 Feb. 1868. The new constitution was adopted in the convention by a strict party vote. It introduced several original propositions. The legislature was reorganized, restrictions were imposed upon the exercise of legislative powers; the veto power of the governor was strengthened; a court of claims was created and the judiciary system was modified. The legislature of 1868 failed to pass an act to submit the proposed constitution to the people; as a result of the general election held in that year, the power of the State was transferred from Republican to Democratic hands. John T. Hoffman of New York was elected governor, largely due, it was claimed at the time, by flagitious debauchery of the ballot boxes in New York city by the Tweed ring which succeeded in carrying the State for the Democratic candidate for President, Horatio Seymour, by 10,000. From this year the vote of the city of New York in State politics was recognized as a powerful factor. Governor Hoffman was called "the veto governor" because of the unprecedented exercise of the veto power. During his four years in office, he vetoed 495 bills, only two of which subsequently became laws. He established the precedent of filing his reason in writing with bills he declined to sign at the end of the legislative session. The Tweed ring during his reign attained the height of its power. For audacity and rapacity the methods of the Tweed ring were unequalled, but it was soon brought to grief through the disclosures of the *New York Times*. In the meantime it had succeeded in re-electing its favorite candidate, John T. Hoffman, who at the close of his office retired to private life. As a consequence of the operations of this ring, two supreme court judges, George G. Barnard and Albert Cardozo and one superior court judge, John H. McCunn, were ordered to be impeached. Barnard was convicted and removed from office; Cardozo resigned and dodged his trial; McCunn was removed and shortly after died of a broken heart. While the exposé of the Tweed ring demoralized the Democrats, the Republicans were more or less torn by the dissensions in their own ranks on national affairs. An agitation for the revision of the constitution had been general throughout the State for several years, had been advocated by Governor Hoffman and was now recommended by Governor Dix, who in his message called attention to the misuse of sinking funds and to the abuse of the appropriations by the legislature for private charities. The State was suffering from the oppressive financial weights that had been imposed by the War of the Rebellion and from the reckless extravagance that had become a part of the body politic. A constitutional commission undertook to curb the expenditures and the squandering of public moneys. Samuel J. Tilden, who defeated General John A. Dix for

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governor in 1874, and who had been actively instrumental in prosecuting the Tweed ring, carefully scrutinized the heavy expenditures that had been made on the canals, and advocated rigid retrenchment. The effect of the financial disasters of 1873 had fallen heavily upon the people of the State. In the winter of 1875 canal boatmen, owners and forwarders petitioned the governor for relief, urging a further reduction of tolls. On 18 March 1875, the governor sent a special message to the Legislature arraigning the management of the canals. A commission was appointed to investigate the system. Twelve special reports were made to the governor, disclosing a long line of abuses and calling for the prosecution and punishment of recreant public officers.

Lucius Robinson was elected governor in 1876. He followed the efforts of his predecessor to curb extravagant outlays upon charitable institutions, urged economy in all public expenditures and used the veto power fearlessly. Governor Robinson was defeated in 1879. Alonzo B. Cornell, Republican, was the successful candidate. But for several years the Republican party, although successful in the presidential election in 1880, was demoralized by the fierce struggle between the Stalwarts and Half-breeds, consequent upon President Garfield's repudiation of Senators Conkling and Platt in the matter of making Federal appointments in the city and State of New York. The assassination of President Garfield, the accession of Vice-President Arthur, the defeat for governor in 1882 of Charles J. Folger, the defeat for nomination to the Presidency of General Arthur, and the election of Grover Cleveland for governor in 1882 and as President in 1884, all resulted from this bitter and unrelenting partisan warfare.

David B. Hill succeeded, as governor, Grover Cleveland, elected President, and held office from January 1885 to January 1892. During these years the first practical step for the creation of an Adirondack State Preserve was taken; the Niagara Falls Reservation was created; use of electricity in death sentences established; and State Board of Arbitration created.

In 1894 very radical modifications were made in the constitution by a convention which assembled in Albany, 8 May and adjourned in September. The new constitution was adopted by the people 6 November.

Governor Hill's successors in the gubernatorial chair were Roswell P. Flower, Levi P. Morton, Frank S. Black, Theodore Roosevelt, Benjamin B. Odell, Jr., Frank W. Higgins, Charles E. Hughes, Horace White and John A. Dix.

**Leading Legislation.**—1892-96. Roswell P. Flower, Governor. Features of legislation were the establishment of the Adirondack Park; ordering a convention to amend and revise the constitution; the prohibition of pool-selling in poolrooms; the excise laws were finally codified; and the question of a Greater New York was ordered to be submitted to a public vote.

1895-96. Levi P. Morton, Governor. The Governor's term of office now becomes two years, instead of three. The two principal features of Governor Morton's administration were the enactment of the "Raines Law"—a high-license measure aimed at reducing the number of saloons and removing them from political influence; and the passage of the

"Greater New York" bill, consolidating the local governments of the city and county of New York, the counties of Kings and Richmond and part of the county of Queens, giving the new metropolis an area of 359 square miles.

1897-98. Frank S. Black, Governor. The charter of "Greater New York" received the signature of Governor Black and its provisions went into effect 1 Jan. 1898. Important canal legislation and the appointment of a commission to investigate the expenditure of canal funds were features of this administration.

1899-1900. Theodore Roosevelt, Governor. Some insurance legislation is accomplished, especially as to the maintenance of a reserve fund; the "Mazet Inquiry" was held, regarding alleged levies for corrupting legislation; and a committee previously appointed to report on a more equitable distribution of taxation recommended important changes in the tax laws.

1901-04. Benjamin B. Odell, Jr., Governor (two terms). "Palisades Park" was created, the New York Legislature acting in conjunction with that of New Jersey; Stony Point Park was purchased and dedicated; much valuable "Greater New York" charter revision was accomplished; a new terminal house act was passed, introducing a number of radical changes; and drastic provisions were passed looking to the suppression of anarchy.

1905-06. Frank W. Higgins, Governor. This administration was chiefly notable for the preliminary insurance investigations and initiatory discussion of direct primary and direct nomination legislation.

1907-10. Charles E. Hughes, Governor (two terms, but the last incomplete by his resignation in October 1910 to accept the office of Justice of the Supreme Court of the United States. Horace White, Lieutenant-Governor, filled out the rest of the term). The administration of Governor Hughes was the most important of any since the war. His first act was an attempt to remove Otto Kelsey, the State Superintendent of Insurance, for inefficiency, which the Senate refused to ratify, and Mr. Kelsey refused to resign. A bill for making the salaries of women teachers equal to that of men in the same grade was vetoed. A Public Utilities Act was passed, bringing all common carriers, light companies, and other public service corporations under the jurisdiction of two commissions. In an extraordinary session of the Legislature in the early summer of 1908 a law was passed prohibiting gambling at race tracks. A long continued struggle was carried on through the latter part of his administration to secure the enactment of some form of direct primaries bill, a special session of the Legislature even being called in June 1910, but without direct result, the Cobb bill, a compromise, failing of passage by only one vote. A progressive inheritance tax law was enacted which will prove very remunerative to the State.

1911-12. John A. Dix, Governor. The most important legislation of his first year's administration was the passage of a compromise election bill that provides for direct primaries in all but the State offices, which are still left to a convention.

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HUGH HASTINGS,

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**New York, N. Y.,** first city in the State and in the United States; situated on the shores of the Hudson and North Rivers and of Long Island Sound and the Atlantic. The city originally began at the lower end of Manhattan Island, and has spread mainly north and east having an area of about 327 square miles. The borough of Manhattan, the business centre of the city, is laid out above 14th street in rectangular streets and avenues. The chief retail business streets are Broadway, Sixth avenue, Fifth avenue, and the Bowery, running north and northwest, and 14th, 23d, and 42d streets, running east and west across the island. Fifth and Madison avenues have been for many years the finest residence streets, but these are now giving way to Riverside and West End avenues, noble thoroughfares overlooking the Hudson and set with large separate mansions. Wall and Broad streets, where centre the financial interests of the city and the nation, are short streets lying east of Broadway and near the southern end of the island.

**Municipal Service and Improvements.**—The streets of New York have a total length of over 2,500 miles, most of which are paved; and it cost in 1909 \$7,418,299 to clean and sprinkle them, and over \$3,000,000 to light them. The total length of the city's sewers is 1,557 miles, and the annual cost of removing the garbage and ashes is \$2,511,789. The city supports public free floating baths on the East and North Rivers during the summer months. There is also free interior permanent baths. All these things help to keep the city death rate down to about 19.06 in 1,000. The city owns its own water-works, including some 2,000 miles of mains, costing about \$125,000,000 and have a total capacity of 544,654,000 gallons, one third more than the average daily consumption. The present water supply of Manhattan is received from the Croton watershed, 30 miles north of the borough. The new Catskill aqueduct now being built will have a capacity of 700,000,000 gallons a day, and the largest reservoir in the system (the Ashokan) once filled could supply the city for 235 days at the present rate of consumption without any water flowing into it. The entire cost of this gigantic undertaking, including watersheds, reservoirs, tunnels, etc., is estimated at \$186,857,000 and it is expected to complete the work in 1915. The police department numbers over 9,000 men, besides harbor patrol steamers; and its cost in 1909 was \$14,160,201. The fire department has a total uniformed force of 4,307 men, and its cost in 1909 was \$8,039,565. The street railways of the city, operated mainly by electricity, cover 1,232 miles of line, and represent an outlay for

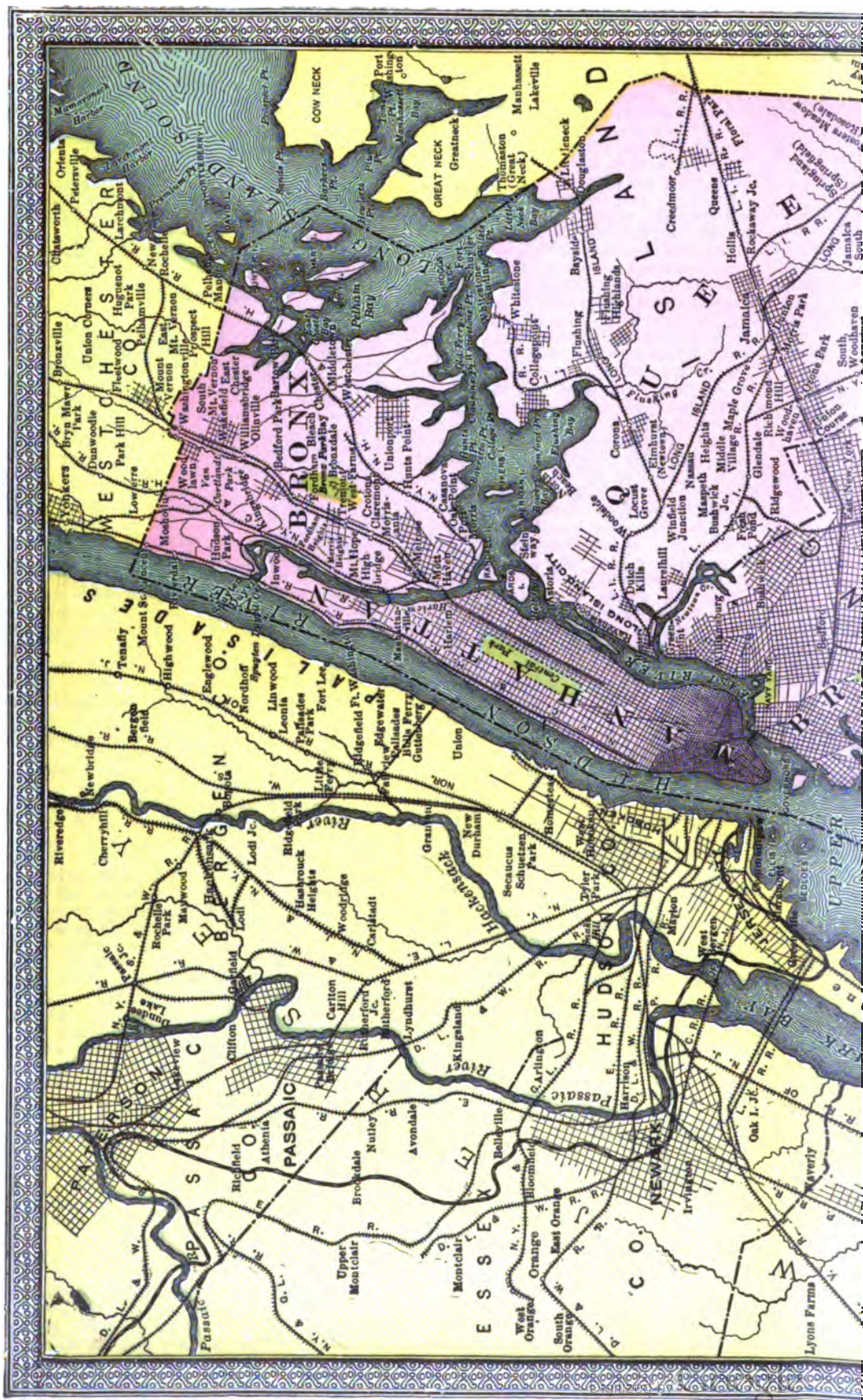
construction and equipment of \$250,000,000. The new subway is 23.5 miles long.

**Public Parks.**—The park system of the entire city covers 7,162.37 acres; that of the boroughs of Manhattan, Richmond, and the Bronx 5,406.7 acres. The largest park in Manhattan is Central Park, covering an area of 843 acres, and representing a cost of \$15,000,000. It extends from 59th street to 110th street. In the southwest corner is the playground and carrousel for children, and beyond the common lawn of 16 acres. The menagerie is in the southeast part. The mall is a broad parade a quarter of a mile long, bordered by double rows of elm trees and famous for its collection of statues. The terrace, a pile of richly carved masonry, and the lake, come next in view, and beyond the lake is the ramble of 36 acres. Farther on is the Belvedere, a tower of stone, and next are the city reservoirs. On the left is the American Museum of Natural History (q.v.). Opposite the Obelisk and near Fifth avenue and 83d street is the Metropolitan Museum of Art (q.v.). The largest park in the Bronx is Bronx Park, in the central northern section of the borough. The northwestern section of 250 acres has been assigned to the Botanical Society, whose gardens are free to the public at all times. The southeastern section of the park comprising 261 acres is in charge of the Zoological Society, and its buildings, cages and ranges are free to the public except on Mondays and Thursdays. Prospect Park, Brooklyn, contains 526 acres.

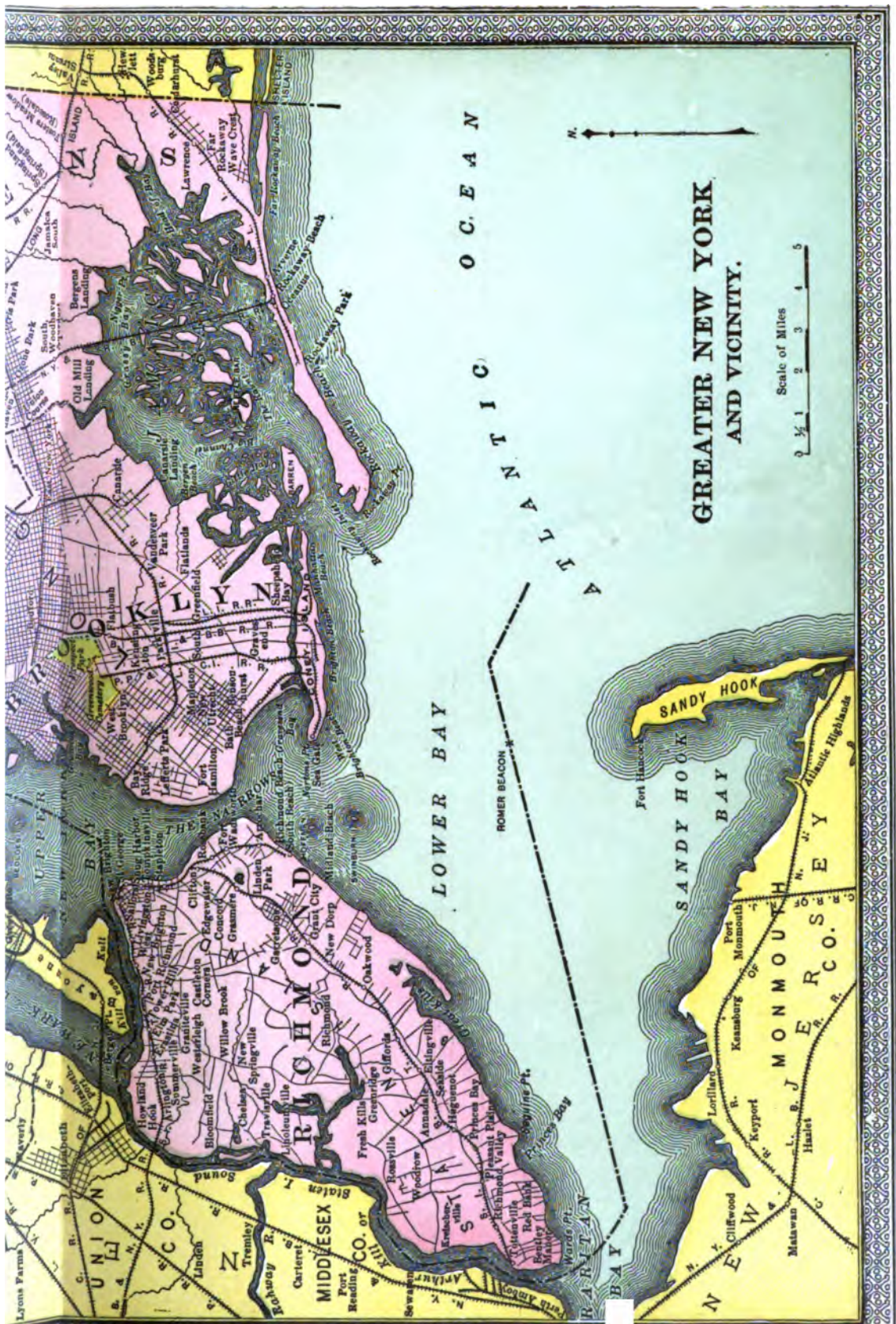
**Chief Buildings.**—First among the buildings of the city devoted to official or public purposes, taking them in the order of their distribution, is the City Aquarium in Battery Park, popularly known as Castle Garden. Originally a fort, this structure later became a public assembly room, and after that for 35 years served as a landing place for immigrants, during which time nearly 10,000,000 immigrants passed through its portals. Since December, 1896, it has been used as an aquarium. The new Customs House, just completed at the foot of Broadway on the original site of Fort Amsterdam, cost \$10,000,000. The structure at the corner of Wall and Nassau streets, built by the general government in 1834, was first used as a customs-house, but has been the home since 1863 of the sub-treasury. A handsome building at 65 Liberty street, the site of which cost \$1,000,000, houses the Chamber of Commerce organized 5 May 1768, in Fraunces' Tavern (still standing at Broad and Pearl streets), and for more than a century the most powerful unit of force in the financial and commercial affairs of the city. A structure of great architectural beauty near the head of Broad street has been the home since the opening in 1903 of the New York Stock Exchange, which, organized on 17 May 1792, has been for many years the financial centre of the continent. The Postoffice building at the lower end of City Hall Park was erected in 1875, and its imposing dimensions bear witness to the wonderful growth of a city whose mail less than 100 years ago was handled by one man. A little to the north of it are the city-hall, completed in 1811, the city courts, Hall of Records, and city prison. Cooper Union at the junction of Third and Fourth avenues houses Cooper Institute, founded by Peter Cooper, for "the instruction of the people of the United States in practical science and art."











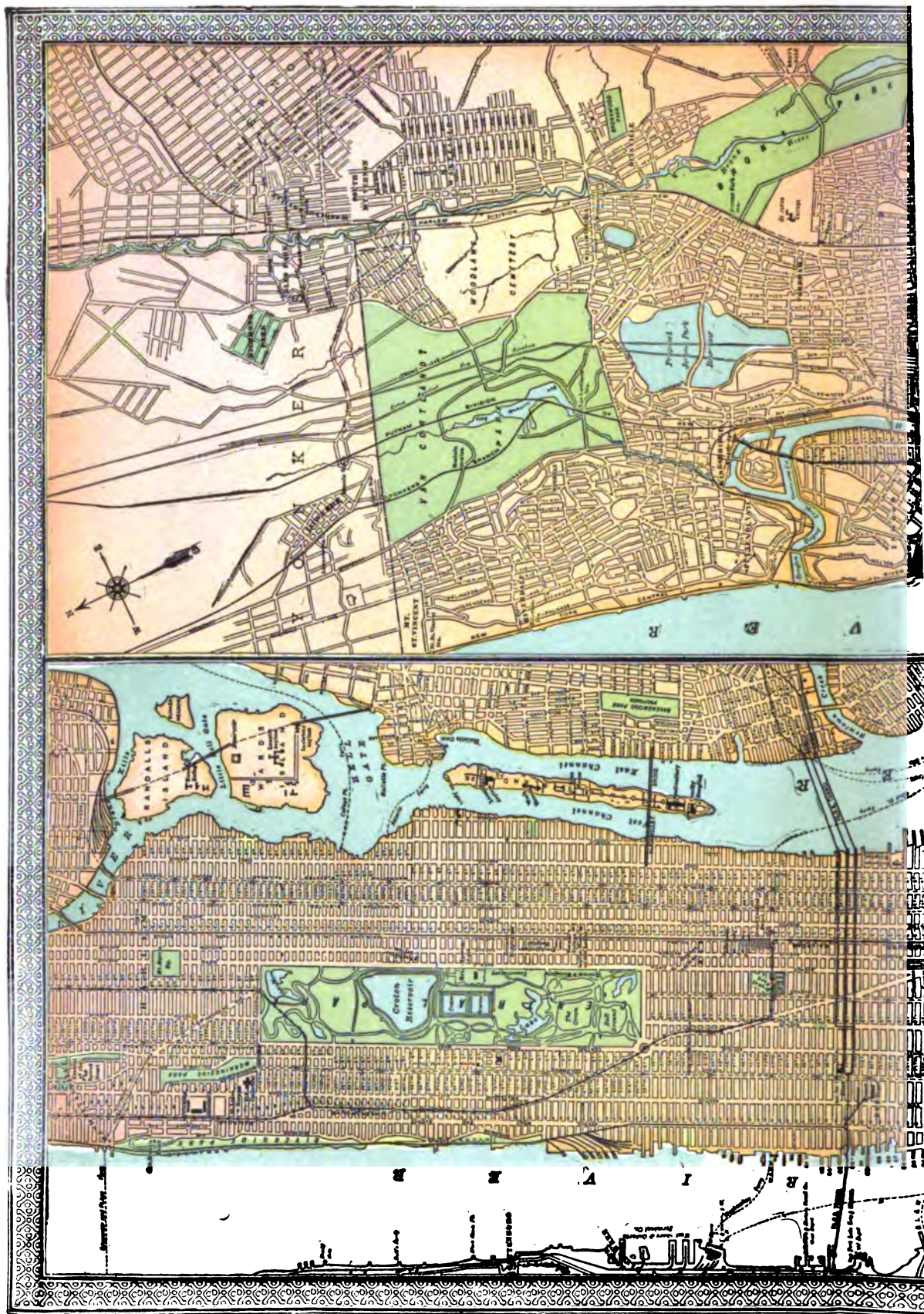
# GREATER NEW YORK AND VICINITY.

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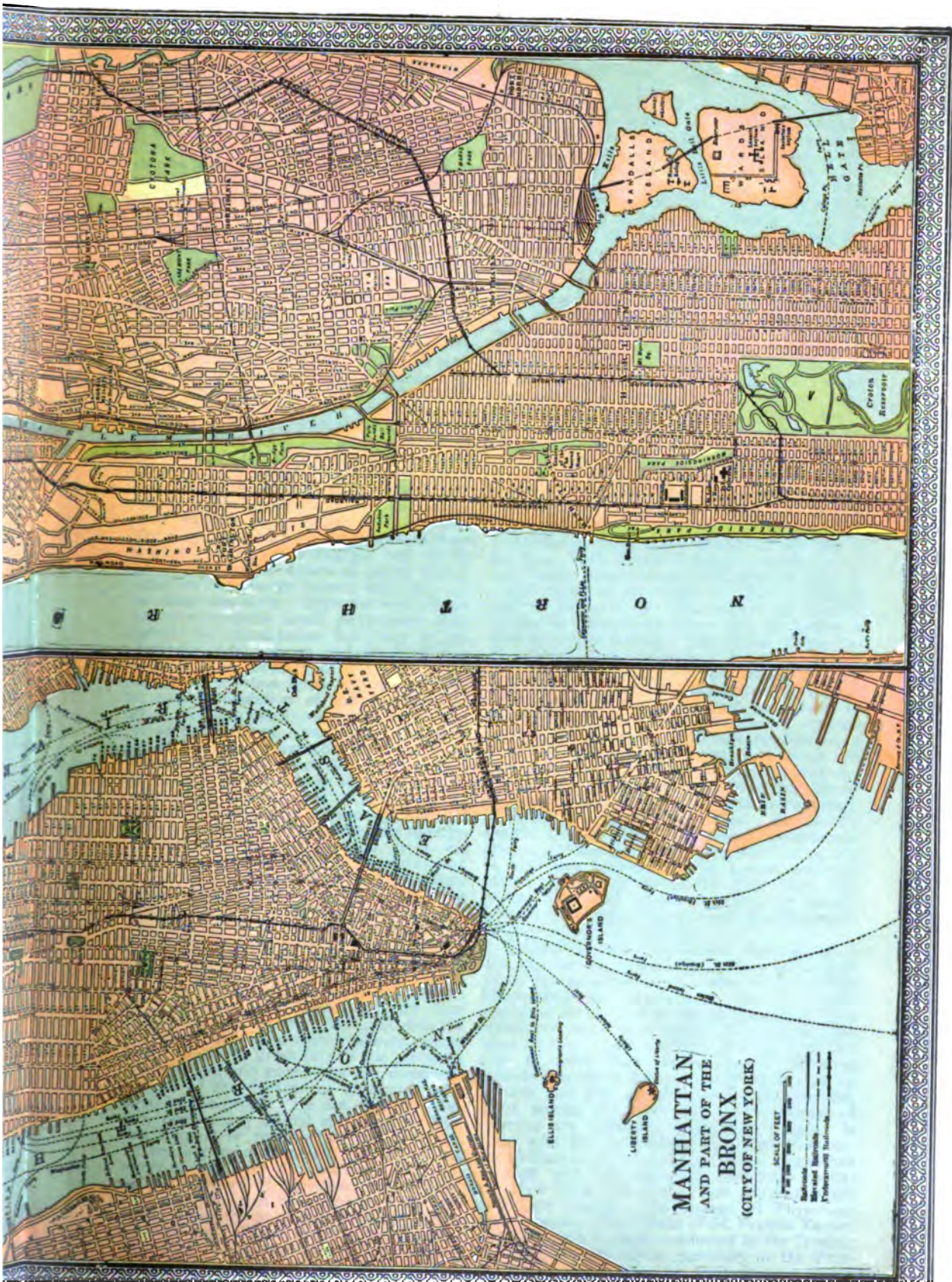
















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The Institute has an endowment of upward of \$2,000,000 and has given instruction to thousands of pupils. Mention must also be made of the Metropolitan Museum of Art in Central Park, which houses the finest art collection in America and has an ample endowment for future purchases; the Metropolitan Opera House, the Manhattan Opera House, the New Theatre, the Singer Building, the Woolworth Building (51 stories), and the Metropolitan Building, with its unique tower and chimes, the New York Public Library, the Pennsylvania Railroad Station, just completed, Madison Square Garden (q.v.), one of the most spacious places of public assemblage in the Western World, and of the building given in 1900 to New York University for a Hall of Fame.

*Population.*—The census of 1910 gave New York a population of 4,766,883. The area comprised within the present limits of New York City had a population of 49,401 in 1790, which has grown to 696,115 in 1850, an increase of 1,309 per cent. The population of the present city has grown to 2,331,542, an increase since 1850 of over 300 per cent. Between 1900 and 1910 there was an increase of 1,329,681, or 26 per cent. The present population is the most remarkable collection of people in the world, the most various in race and religion ever gathered together in such numbers in the history of mankind. In 1900 only 21.5 per cent of the population were native whites of native parentage, and on Manhattan Island only 16.9 per cent or about one sixth. Since the 1900 census was taken even these small percentages have diminished, for immigration has been in unprecedentedly great volume, and the birth rate is highest in the districts of the city where the population of alien birth is largest. Even of the native population of native parentage, 737,477 in number, nearly one fifth were born outside of the State of New York. The great feature of the city's population, however, is its immediate foreign derivation. Almost every race on the globe is represented in its population.

*Government.*—The charter of New York, as revised by the Legislature of 1901, follows, in the main, the lines of the charter of the old city, with important provisions adopted from the charter of the former city of Brooklyn, and from those of other American and European cities. The greater part of it is the law as it has existed for half a century, and the chief changes have to do with the adoption of the borough system and the system of giving control to localities over their own affairs. The executive power is vested in the mayor, the presidents of the boroughs and the heads of the departments. The mayor, who holds office for four years and is eligible for re-election, appoints the heads of departments and commissioners, except those over which the presidents of the boroughs have jurisdiction, and except also the comptroller or head of the department of finance who is elected by the people. He can, with few exceptions, remove any official appointed by him, and can himself be removed by the governor, after a hearing upon charges. The mayor has the power of veto over all ordinances and resolutions of the Board of Aldermen, but an ordinance or resolution can be passed over his veto by a vote of two thirds of the members of that body, except that when it involves the expenditure of money, the creation of a debt or the lay-

ing of an assessment, a three fourths vote is required. The president of each borough holds office for two years. He presides over each local board in his borough, with the right to vote on and of veto over its actions, and is an ex-officio member of the board of estimate and apportionment. He is also a member of the Board of Aldermen and has the same right to vote as any member elected to that body. The borough president appoints and may at pleasure remove a commissioner of public works for his borough with control of all matters relating to the improvement and repair of streets and sewers. He also has control of the public buildings in his borough except schools, hospitals, penitentiaries and fire and police stations, and exercises the supervision vested in the city over the construction of buildings in his borough, except such powers as are directly vested in the Tenement House Commission. In 1908 a new charter was drawn up for New York City, by order of Governor Hughes, containing several modifications from the older document. Among the principal changes proposed are (1) the reduction of defective administrative offices, (2) separation of appropriating and spending powers, (3) greater concentration of responsibility, (4) abolition of Board of Aldermen. No action has yet been taken upon this charter.

*Libraries.*—The chief library of the city is the New York Public Library—Astor, Lenox and Tilden Foundations, established in 1895 by consolidation of the Astor and Lenox libraries and the Tilden Trust. The Astor was founded in 1849 by John Jacob Astor, and the Lenox in 1870 by James Lenox. The Tilden Trust was created in 1884 by the will of Samuel J. Tilden, and at the end, by compromise, of a legal contest, became possessed of \$1,000,000. The consolidated library has an invested endowment of \$4,500,000. It contains 756,000 bound volumes and 220,000 pamphlets, and is eventually to be housed in a building in Bryant Park which will cost \$2,800,000. The Carnegie endowment, announced in 1901, provides for 50 branch library buildings which will cost over \$3,000,000, many of which are already completed. Besides the Public Library, there are many institutional, private and special libraries, the chief being that of Columbia University, with 330,000 volumes; others are the library of the New York Historical Society of 100,000 volumes; the Society Library of 100,000 volumes, and the Mercantile Library of 233,000 volumes.

*Education and Intellectual Associations.*—The city has about 500 schools, free and wholly supported by taxation at a cost of more than \$35,000,000—the largest sum spent for public education by any community in the world. Five eighths of the annual outlay represents the salaries of over 13,000 teachers, who give instruction to more than 600,000 pupils. Evening schools cost about \$700,000 a year, and vacation schools and play grounds more than \$300,000. First among the city's higher institutions of learning are Columbia University, founded in 1754, with 600 instructors and 5,000 students; the College of the City of New York, established in 1848, with 120 instructors and 2,100 pupils; the New York University, with 369 instructors and 4,175 students; the College of Physicians and Surgeons; the College of St. Francis Xavier, and St. John's College, conducted by the Jesuits; the General Theological Seminary of the Prot-

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estant Episcopal Church; Manhattan College; the Conservatory of Music; the New York Law School, the Normal College, and the Union Theological Seminary. A majority of the hospitals have training schools for nurses. There are many art and literary associations, chief among them the New York Historical Society and the National Academy of Design; and over 100 dramatic and musical clubs, about 200 social clubs and as many theatres.

**Charities.**—First among the charitable institutions of the city is the Charity Organization Society, which is supported by voluntary contributions and legacies and serves as a centre of inter-communication between various churches and charitable agencies. There are 28 hospitals, refuges and asylums which receive government or official aid, and about 100 hospitals and dispensaries supported by voluntary contributions and private endowment. Twenty-nine institutions and associations are conducted for the relief of the aged, and 122 for the relief of children. In the latter class mention should be made of the Children's Aid Society, organized in 1853, which has provided 75,000 boys and girls with homes and places of employment, and in its industrial schools given aid and instruction to over 115,000 children; the New York Foundling Hospital, which is controlled by the Sisters of Charity and contains 4,300 inmates, and the Society for the Prevention of Cruelty to Children, by which an average of 9,000 complaints are yearly received and investigated. There are 26 organized agencies for the reformation of children, fallen women and intemperate men; these include the Catholic Protectors, where 4,500 children are taught trades and industrial employment, and the House of Refuge, where 1,300 boys and girls, received upon commitment of the city courts, are given a common school education and industrial instruction. Noteworthy among agencies for rendering special or temporary relief to the poor are the Grace Institute, endowed by William R. Grace in 1897 to furnish women and girls instruction in trades and occupations and which now has 900 pupils; the Legal Aid Society, which gives free legal aid and assistance to those unable to procure the same; the Prison Association of New York, which aids reformed convicts after discharge; the Provident Loan Society, which loans on pledges of personal property at one per cent a month; the Baron de Hirsch Fund for the benefit of Hebrew immigrants; 15 Church and College Settlement Houses; and the Sailor's Snug Harbor on Staten Island, where a home is provided for 900 aged and decrepit sailors. Mention must also be made of the Society for the Prevention of Cruelty to Animals, founded in 1864 by Henry Bergh, and the parent of similar organizations in many other States and cities.

**Churches.**—New York is the seat of a Roman Catholic and of an Episcopal archbishop. There are in the city, exclusive of Brooklyn, about 800 churches and religious societies. The Roman Catholics have more than 150 churches, the Episcopalians 140, and the Methodist Episcopal more than 100. The Presbyterians, Baptists, Lutherans, Reformed and Congregational bodies combined have more than 300 churches. And the Disciples of Christ, Moravians, Universalists, Unitarians, Friends and Christian Scientists each have a number of fine churches,

while the Jewish synagogues number 120. There are also many independent organizations representing every kind of religious belief. The value of church property in the city, exclusive of Brooklyn, is about \$1,000,000,000. The finest church building is the Roman Catholic cathedral in Fifth Avenue. Of the others the most notable is Trinity Church in Broadway at the head of Wall Street, which has the longest continuous history of any parish in the city. It was in 1697 that William and Mary granted a parcel of land "in or near to a street without the north gate of the city, commonly called Broadway," for use "as the parish church and church-yard of the parish of Trinity Church within our said city of New York." The church built on this grant was occupied in 1698. Destroyed in the fire of 1776, the church was rebuilt two years later on the original site; but the second building was found to be unsafe in 1839, and in 1846 was replaced by the present structure. The new Protestant Episcopal cathedral of St. John the Divine, located on Morningside Heights, now partially completed and opened for worship in part, will be when completed the costliest church edifice in America.

**Finances and Banking.**—The assessed valuation of property within the city for the year 1910 was \$7,250,500,559, the most of it being real estate. The net bonded debt of the city is \$730,166,282. The city expenses are \$97,119,031 a year, the tax rate 2.273 per cent, and the city owns property valued at more than \$350,000,000. There are 422 banks of discount (53 national), 49 savings banks, 49 trust companies and 133 building and loan associations. The total stock of the 37 national and 17 state banks which are members of the Clearing House Association is \$109,822,700, and their undivided profits \$129,257,100—a total of \$239,079,800 actual capital invested in these 46 institutions. The trust companies of New York own about \$200,000,000 of stocks and bonds; the state banks recently owned nearly \$10,000,000, and the national banks (exclusive of bonds held to secure circulation and United States deposits) owned over \$100,000,000—a total of more than \$300,000,000 in securities owned by the banks and trust companies of the city. Two notable developments in the New York banking world in recent years have been a great increase in bank capitalization leading to the creation of \$25,000,000 and \$10,000,000 banks, and the establishment of powerful chains of banks and trust companies—that is to say, the close affiliation by ties of common ownership, of a number of large credit institutions, so that it may be said that six or seven such chains now constitute the money power of New York. The largest of the city's savings banks is the Bowery Savings Bank, which in 1911 had upward of 148,000 accounts open with a total amount deposited of \$102,450,000. There are 36 fire and marine and 5 life insurance companies in the city. The best known of the city's financial institutions is the Stock Exchange, an association for the exchange of securities for currency or its representatives. The securities bought and sold at the New York Stock Exchange are certificates of stocks, and bonds issued under national, state, or municipal authority, or by corporations doing business as common carriers, or in banking, mining, manufacturing, or other



1. Cathedral of St. John the Divine.

2. The Metropolitan Museum of Art.



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industrial pursuits. The cash value of the annual transactions in this national monetary institution defies ordinary comprehension. The chief business of its members is buying and selling these stocks and bonds for outside clients and so great is the demand for their services that an average of \$200,000 a day or \$70,000,000 a year is distributed among them in commissions—the charge being one eighth of one per cent on the par value of every transaction. The Stock Exchange is limited to a membership of 1,200, and all new members are now admitted through transfer, "seats" being worth from \$65,000 to \$75,000.

**Trade and Commerce.**—Nature and man have made New York the main portal of the foreign commerce of the United States. Manhattan Island has over nine miles of docks, but this is not the limit of the city's capacity. Miles of the Hudson River front on the New Jersey side are owned by the great railroad corporations, whose terminals afford docks for the reception of freight and passengers. Across the East River are the docks of sugar refineries, factories, warehouses, government storage houses, and great basins for canal boats, while of late years the shores of Staten Island have been hidden by the growth of docks. The total tonnage of the over-sea vessels entering and leaving the port of New York in 1908 was 24,094,744, and if the figures of its coastal are included with those of its deep-sea trade, New York is to-day the leading seaport of the world. Its total import trade is now over \$688,000,000 a year, or 55 per cent of the imports of the whole country, and its total export trade more than \$700,000,000, or three fifths of the exports from all the ports of the United States. There are owned in New York over 4,000 vessels of all classes, with a total tonnage of about 1,250,000. More than 150 steamship and steamboat lines run from New York to points on the coast, sound, and river, and to ports in Central and South America, Europe, Africa, Asia, and Australia. As to the railroads, it is the terminal of the main line of the Central Railroad of New Jersey, the Pennsylvania, the New York Central, the Erie, the New York, New Haven & Hartford, the West Shore, the Delaware, Lackawanna & Western, the New York, Lake Erie & Western, the Long Island, and the New York, Ontario & Western. The New York Central is now making terminal improvements which will cost \$25,000,000, while of even greater importance is the Pennsylvania tunnel just completed under the Hudson and East rivers and the boroughs of Manhattan and Queens, opened 8 Sept. 1910, representing nearly half a century of thought and costing, with all incidental improvements, about \$160,000,000. This will afford continuous track connection between the Pennsylvania and Long Island railroads, with a central station in the borough of Manhattan, and a terminal emergence of the tunnel system at a point near Thompson Avenue, Long Island City. The plans for this improvement, devised by Charles M. Jacobs, involved five tubes, each 18 feet 6 inches inside diameter. Three of these tubes are 100 feet below high tide under the Hudson River, and two under the East River, each tube holding a single track. The tunnel system converges at a central station located in Manhattan. The station structure, designed after the Quai d'Orsay in Paris,

but twice as large, is 1,500 feet in length by 500 feet in width, and enclose 25 tracks at tunnel level, which are approached by gradual carriage drive and walk ways. The tunnel tubes are laid below 31st street in Manhattan, and underneath Long Island City in Queens. The entire length of the tunnel system is 15 miles, and its cost \$50,000,000.

**Manufactures.**—New York is a great manufacturing as well as trading city. There are at the present time about 550,000 people employed in manufacturing industries in the city, in over 25,938 establishments. These establishments represent an invested capital of over \$1,000,000,000 and each year pay upward of \$210,000,000 in wages. The annual cost of the materials used by them is \$1,692,155,000, and the value of their finished product about \$2,000,000,000. The principal industries, aside from food, tinsmithing, and mason, carpenter and structural iron work, are the manufacture of sugar, tobacco, and clothing; of brass and copper, chemicals, patent medicines and compounds, clocks, watches, and musical instruments; of rope and cordage, products of iron and steel, boats and sails, glass and glassware, arms and ammunition, india rubber and leather products: of instruments for scientific purposes, gold and silver ware, malt liquors and distilled spirits, paper, oils, paints, pigments and colors; products of cotton, wool, and wood, and of soap, starch, and matches. Mention must also be made of fine printing, lithographing, engraving and map making in which New York holds first place in America. All told the industries conducted in the city number more than 1,000, and the rate of increase recently has averaged 16 per cent a year.

**History.**—The first white men known to have visited Manhattan Island, the future site of New York city, were Giovanni da Verrazano, an Italian sailing in the French service, and Diego Gomez, a Portuguese sailing in the Spanish service, both of whom, while seeking a westerly way to the Indies in 1524, entered what is now the harbor of New York. Nothing, however, in the way of colonization came of their voyage. Eighty-five years later, in April 1609, Henry Hudson, an English adventurer in the service of the Dutch East India Company, sailed from Amsterdam as captain of the ship Half Moon, with a charge from his employers to seek a water route to the Indies by the north side of Nova Zembla. Ice early blocked his advance into the Arctic, and so, heading westward, a month's cruise brought him, in July, to the coast of Newfoundland. Thence he sailed southward to the James River, Virginia, and, again altering his course, still in pursuit of a new channel to India, came on 11 Sept. 1609 upon the river which bears his name. He anchored for a time at its mouth and then sailed up the stream until warned by shoaling water that he was at the head of navigation, near the present site of Albany; whereupon he turned his vessel southward, and early in October set out on his homeward voyage. Hudson's account of the stores of fine peltries he had seen in the possession of the Indians moved his employers to prompt action, and in 1609 the former mate of the Half Moon was sent across to trade with the savages and report further upon the country. Handsome profits attended this venture, and in



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1613 the *Fortune* and the *Tiger*, commanded respectively by Hendrick Christaensen and Adrian Block, sailed for the Hudson River, being followed within a year by three other vessels from Amsterdam and Hoven. These carried back to Holland such generous cargoes of furs that their owners hastened to open regular communication with the Hudson River country and to establish posts at its head and at its mouth for the purchase and collection of skins while the vessels were on their voyages to and from Holland. The main post, called Fort Nassau, was located just below the site of Albany; but a smaller fort was built on Manhattan Island, its site being just south of the present Bowling Green. Captain Christaensen was appointed head man over both posts, and he and his half dozen comrades were, therefore, the first white settlers on Manhattan Island. Though Christaensen soon lost his life in a quarrel with the Indians, the trade he had helped to found grew and prospered, and soon the merchants who had first engaged in it joined with others in the formation of the United New Netherlands Company, to which, so far as the power lay with the States-General of Holland, was granted for three years from 1615 the monopoly of the fur trade with the newly opened country. This monopoly was renewed for a year at a time until 1621, when the Dutch West India Company came into existence with chartered rights to the exclusive trade of all the coasts of both Americas. The new corporation was, speaking in a broad way, a commercial federation, with branches established in the several cities of Holland. Each branch, though subject to the collective authority of its fellows, was clothed with distinct rights and privileges of its own, and was assigned a specific territory, over which it exercised the right of government and of trade. Thus, the post on Manhattan Island, with its dependent territory, was assigned to the Amsterdam branch, which at once addressed itself to the development of what had now come to be known as the Province of New Netherlands. Accordingly in 1623 thirty families of settlers were sent out from Amsterdam, and a part of them put ashore on Manhattan Island. More colonists arrived in 1625, men who had come as homemakers, and not as transient traders; and to confirm this promise of permanency Peter Minuit was appointed director-general of the colony, with power to organize a provisional government. He arrived at his post in May 1626, at the head of another band of colonists, and having bought Manhattan Island from its Indian owners for a consideration of \$24 he proceeded to christen the infant town New Amsterdam. Recalled from his directorship in 1632, Minuit was succeeded in turn by Wouter van Twiller, William Kieft and Peter Stuyvesant. A savage Indian war in Kieft's time well nigh extinguished the colony, but it made rapid recovery under Stuyvesant, who directed its affairs from 1647 to 1664, and by the year last named the hamlet on Manhattan Island has become a town of 1,000 souls, under the government, organized in 1652, of a schout, two burgomasters and five schepens, while thriving settlements had sprung up on both sides of the Hudson and on the lands about the Bay.

The Dutch, however, did not long retain possession of New Netherlands. The English claimed the entire continent as having been dis-

covered by Cabot, and whenever the English and the Dutch were at war New Amsterdam had always to fear the threatened attack of some English squadron. The dreaded blow finally fell in 1664, when Charles II. resolved to seize New Netherlands by surprise. In pursuit of this purpose the king made to his brother James, Duke of York and Albany, a grant which included the whole of the Dutch possessions in America, and late in August 1664 a British squadron appeared before New Amsterdam and demanded its surrender. The coming of the English found the town ill-prepared for a siege, and though Stuyvesant wished to fight, even against heavy odds, he was not allowed to have his way. Articles of capitulation were quickly agreed upon, and on 8 September the flag of the West India Company fell from Fort Amsterdam to be replaced by that of England, and Colonel Richard Nicolls took possession of the town and province in the name of the English king and for the use of the Duke of York.

1 New Amsterdam was speedily renamed New York, and in June 1665 the city government was reorganized, in accordance with English customs, by replacing the schout, burgomasters, and schepens with a sheriff, aldermen, and mayor. Once again, from 30 July 1673 until 10 Nov. 1674, the Dutch were in possession of the town and province; but the treaty of Westminster finally transferred them from the States-General to England; and the permanent change of ownership was attended by a change of policy which made for the more rapid upbuilding of the town. One important act looking to this end bestowed on New York the sole right to bolt and export flour. The Bolting Act remained in force from 1678 until 1694, and during that time it trebled the population of the town, and gave a prosperous permanency to its foreign commerce. According to the provisions of the act no person outside of the city could grind flour for market or pack breadstuffs in any form for sale. The result of this interdict was to throw the considerable and growing export trade in breadstuffs, mainly with the West Indies, wholly in the hands of the millers and merchants of New York, so that during the sixteen years that the act remained operative the city revenues more than doubled and the total number of buildings in the town increased from 384 to 983, two thirds of which depended in one way or another on the trade in flour, while the port's sailing craft grew from 11 to 85 sloops and ships.

It was while the Bolting Act was still in force that, on 22 April 1686, New York received the charter,—known as the Dongan charter, because granted through the governor of that name,—which still forms the basis of its civic rights. The governor, under this instrument, appointed the mayor and sheriff, but the city was allowed a large quantity of real estate, from some of which it draws a revenue to the present day, while the aldermen were elected by the freeholders of the six wards into which the town had been recently divided, and enacted by laws for its government. The Dongan charter, amended by Queen Anne in 1708, was further enlarged by George II., in 1730, into the Montgomery charter, which, confirmed by the assembly of the province in 1732, made New York virtually a free city. The mayor until the Revolution was appointed by the governor



LOOKING NORTH ON BROAD STREET, NEW YORK.

SHOWING BUILDING OPERATIONS IN MIDDLE DISTANCE







LOOKING WEST ON FORTY-SECOND STREET, NEW YORK.  
Hotel Manhattan on the right. One side of the street is torn up for subway construction.





in council, until 1821 by the governor of the State and four members of the council of appointment, and then for thirteen years by the common council of the city. Since 1834 he has been chosen by the people.

The revolution by which, in April 1689, the crown of England passed from James II. to his daughter and her husband, bred a popular uprising in New York, and control of affairs passed for the time being from the crown officers to a Committee of Safety of ten members, chosen by the citizens. This committee appointed Jacob Leisler, a leading merchant, captain of the fort, and invested him with the power of commander-in-chief until orders should arrive from the new sovereigns. This arrangement was opposed by the so-called Aristocratic party, whose leaders had been office-holders under King James, but without effect, and the government of the town and province remained in the hands of Leisler until March 1691, when Colonel Henry Sloughter, who had been appointed governor of the Colony by William and Mary, arrived in New York. Leisler declined to surrender the fort unless assured immunity for his acts as governor. This was refused by Sloughter, who had fallen under the empire of the Aristocratic party, many of Leisler's followers deserted him, and he was thrown into prison. A little later, with his son-in-law Jacob Milborne and other of his adherents, he was brought to trial charged with treason and murder. All were found guilty by a prejudiced and hostile court, and Leisler and Milborne suffered death on the gallows. Their execution was little less than a judicial murder. Leisler's son afterward secured an order for the restoration of his confiscated estate, and, in 1698, an act was passed by the Parliament of England which canceled the judgments of the court in New York and sustained Leisler's course as governor. Three years afterward the bodies of Leisler and Milborne, denied funeral honors at the time of execution, were taken from their temporary resting place, near the present site of the Sun building, and, after lying in state in the City Hall, were with impressive ceremony reinterred in a burial-ground which stood in what is now Exchange Place. No man knows their present sepulture.

The political turmoils of the period did not retard the growth of New York, and the opening of the 18th century found the town's population increased to 5,000 souls,—Dutch and English nearly equal in numbers; a few French, Swedes, and Jews, and about 800 negroes, nearly all of whom were slaves. Slave importation into New York began some time prior to 1628, and reached a climax about 1746, when a census of the town showed 2,400 slaves in a total of less than 12,000 population. Thereafter each year marked a lessening demand for slaves, though they continued to be bought and sold during the entire colonial period. One reason for the decline of slave-holding and slave-buying in New York was the dread of a servile insurrection, dread which led uprisings among the blacks to be punished with unsparing hand. When, in 1712, a party of negroes, forming a wild plot to slay all the whites, met at night in an orchard near Maiden Lane, and killed and wounded a dozen men before being put to flight, 21 of those captured were shot, hung or burned at the stake. Reprisals even more sweeping attended the "Great Negro Plot" of 1741, a

panic compounded of fear, rage and suspicion, which has been likened to the witchcraft delusion at Salem Village in 1692. This panic had its origin in a series of fires which in March 1741 alarmed the town, and fixed in the minds of many citizens the belief that they were the work of disaffected slaves.

A short time before the indentured servant-girl of a low tavern-keeper on the North River had been arrested, together with her master and mistress and two negroes, for complicity in a robbery. When a proclamation appeared offering a reward with a full pardon to any conspirator who would tell what he knew about a plot for burning the town, she saw in it a chance to regain her freedom, and "confessed" that her master and mistress, along with sundry blacks and semi-criminal whites, had matured such a plot as the first step in a projected uprising. It has ever since been doubted whether this plot was anything more than a figment of the imagination of a depraved and abandoned girl, but at the moment the creature's charges produced a reign of terror, and scores were jailed and put to death on little save her unsupported statements. Fourteen negroes were burned at the stake, 18 were hanged, and 71 transported, while of the 20 whites thrown into prison four were condemned and put to death. Glutted with victims, the panic finally subsided in September 1741, leaving behind it one of the darkest pages in the history of the city. It would be unjust, however, to judge this affair by the standards of a later time. Fear and terror, fed by fraud, appear to have prompted some awful mistakes, but those who committed them lived and acted under the hair-hung sword. The panic of 1741, moreover, was followed by a wholesome revulsion of popular feeling in favor of the negroes. They were admitted to the franchise within 10 years, and in 1758 the abolition of slavery in New York was practically accomplished by an act which declared that from that time forth all children born of slave parents should be free.

During the first part of the 18th century ocean industries were what mainly contributed to New York's growth and wealth. Kalm, the Swedish traveler, records that 211 vessels entered and 222 vessels cleared from this port in 1730, and the town's river, coast and sea trade grew steadily until the opening of the Revolution, when about one tenth of all the foreign commerce of the colonies was centred at New York. But with the arrival of the British army of occupation, 15 Sept. 1776, a seven years' blight settled over the town. During this period it lost more than half of its population and all of its commerce, and was twice visited by destructive fires. These laid a full fourth part of the town in ashes, nor was any attempt made to repair the devastation until after the British evacuation, 25 Nov. 1783. The war ended, however, the men of New York faced the future with stout hearts. "The town is ruined by the war, but its future greatness is unquestioned," wrote one of them; and in this hopeful spirit was begun the work of building anew—a work pushed with such resolute purpose that within eight years from the town's evacuation its population trebled and its commerce regained and passed its former limit. During this period also it was for a year and a half the capital of the Federal government, and in the Federal

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Hall in Wall Street, on 30 April 1789, Washington was inaugurated first President of the United States.

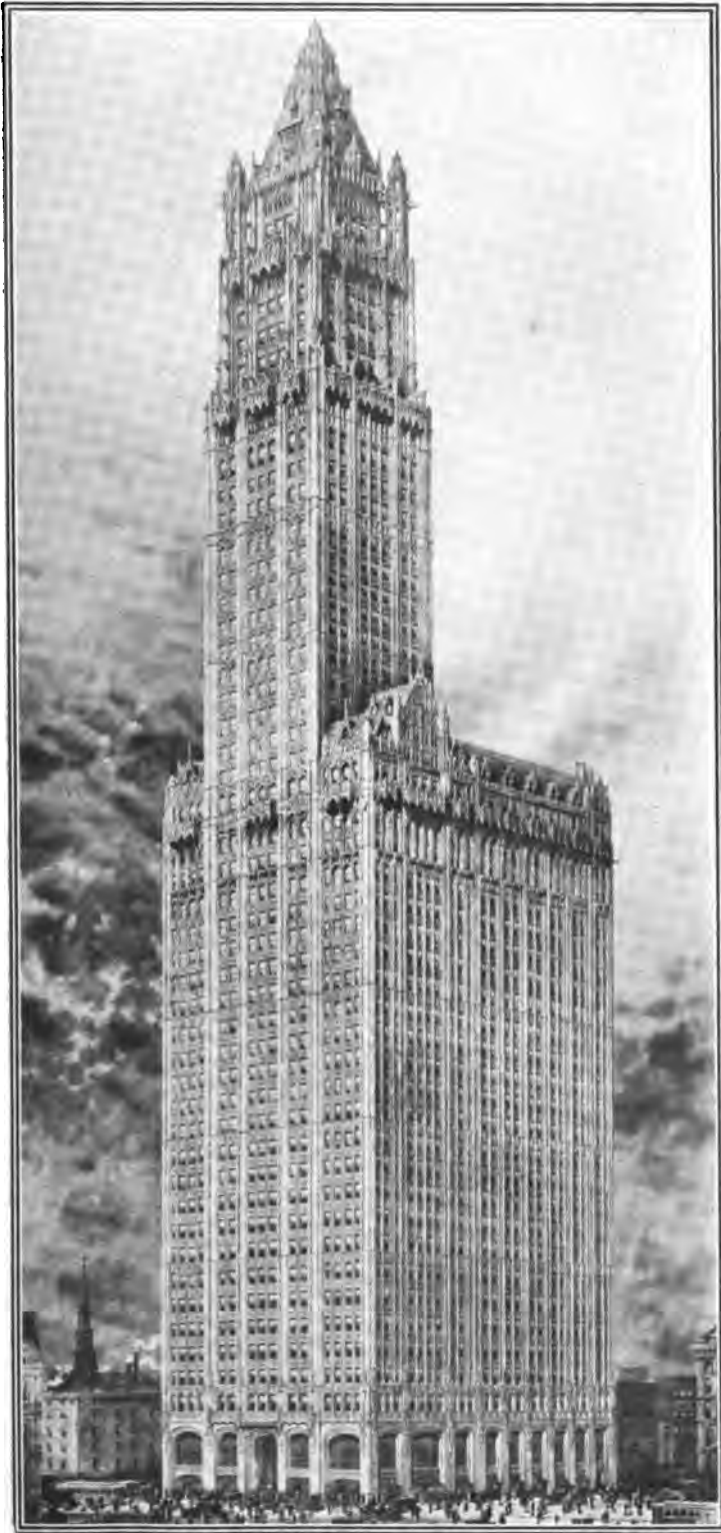
New York ceased to be the Federal capital in August 1790, but this did not retard its growth, and in 1807, by which time it had reached a population of 60,000, robust faith in its future prompted the appointment of a commission to plot the city south of 155th Street substantially as it exists to-day. The commissioners, however, had hardly begun their task, duly completed in 1811, when New York was made to suffer from the chain of events which led to and attended the second war with England. The act of embargo passed by Congress, in September 1807, dealt what seemed at the moment a mortal blow to the prosperity of the town; and John Lambert, the English traveler, writes that in April of the following year he found 500 vessels in its harbor lying up useless and rotting for want of employment, while the losses of the next six years bore more heavily upon New York than any other city. But with the conclusion of a treaty of peace in December 1814 the town's commerce revived on the instant, and the annual revenues of the port, which had fallen to but little more than \$500,000, shot up in 1815 to \$14,000,000.

The end of another two years brought the practical inception of an enterprise to which the modern city is largely indebted for its commercial supremacy,—the cutting of a waterway from the Hudson River to the Great Lakes. The Erie Canal, begun on 4 July 1817, and completed on 26 Oct. 1825, made New York the gateway to the commerce of half a continent; and so profoundly did this union of the inland and the outland seas affect its growth that the year 1835 found it a city of 200,000 souls. A fire in December 1835, which caused a money loss of upward of \$20,000,000, and the financial panic of 1837, were temporary checks to this growth, but only temporary ones. Gas was introduced into the city in 1825; the first street railway was set afoot in 1831, and in 1851, with the completion of the first trunk line to the Great Lakes, was inaugurated the railway service which has long made New York the seaboard terminus of all east and west lines. This was the Erie, begun in 1836, and extending from Piermont on the Hudson to Dunkirk on Lake Erie. Two years later the second trunk line connecting New York and the West, the New York Central & Hudson River Railroad, was established by the consolidation of a number of shorter lines. Several railroads had been built meanwhile in New Jersey, connecting New York with Philadelphia and other points. These in the process of time became one corporation, as the United Railroads of New Jersey, only to be in turn absorbed by the Pennsylvania Railroad, which after 1854 connected Philadelphia with Pittsburg, thereby not only perfecting New York's connection with the Middle and Southern States, but also sending from the heart of commerce an artery of traffic into the Middle Western States. The building of these and other lines, called, however, for the investment of large sums of money, from which quick returns were expected, and this bred a spirit of speculation whose blighting influence spared no part of the nation. The banks of New York suspended payment from October until December, trade and industry came to a standstill, and

there were 5,000 failures, with liabilities exceeding \$300,000,000. But confidence returned with the spring, and with it a resumption of railway construction, which, though temporarily retarded by the Civil War, has ever since tended in growing measure to strengthen New York's hold upon the business of the interior of the country. To-day ten trunk lines terminate in New York, which is also the objective point of a major portion of the traffic of all the railroads running east and west.

New York's devotion to the Union during the Civil War found expression in many ways. A sixth of its able-bodied male citizens were in the field before the close of the first year of the struggle, while from the first the women of the city busied themselves with efforts to care for the soldiers in camp and hospital and for their widows and orphans. They led in the founding of the Sanitary and Christian Commissions, and a single fair held in behalf of the former yielded more than \$1,000,000. A kindred organization ministered to the necessities of refugees from the South, and a Soldiers' Rest was established on the site of Madison Square Garden, where soldiers could find a temporary home while on their way to and from the front. But in no form did New York's devotion to the Union find more sufficing expression than in the labors of the Union League Club, which, founded in the closing days of 1862 on the basis of "absolute and unqualified loyalty to the government, and unwavering support of its effort for the suppression of the rebellion," counted among its members every loyal citizen of note in the town; \$210,000,000 were subscribed by the bankers and capitalists of Manhattan to the loans made by the government between 1861 and 1865, and the major portion of this sum was furnished or secured by members of the Union League Club. There was but one blot on New York's story of splendid loyalty. Proof of the existence of a turbulent element in the population had been furnished in 1849 when some thousands of rioters, taking into their own hands a quarrel between Edwin Forrest and the English actor William Charles Macready, sought to drive the latter from the stage of the Astor Place Opera House, but were held in check by the police, fired into by the militia, and finally dispersed; and the same lawless spirit found expression in an outbreak yet more ferocious in July 1863. Congress had passed a draft law that unwisely exempted from its operation all who should pay into the Federal treasury the sum of \$300, and the discontent thus produced was systematically fomented in New York city by pot-house politicians, who in bar-rooms and on street corners declared the draft unconstitutional, and that it bore with peculiar oppressiveness on the poor man. Many vowed resistance, and, borrowing courage from the fact that the city, to beat back Lee's invasion of Pennsylvania, had been denuded of all but 300 troops, made plans to attack the drafting officers. No trouble occurred on the first day of the draft, 11 July, but on the third, 13 July, an organized mob attacked and wrecked the office of the provost-marshal at the corner of Third Avenue and 46th Street. Then the rioters, inspired by animosity toward the negro race, made a raid on a colored orphan asylum in Fifth Avenue, between 43d and 44th streets; and though a handful of policemen aided the nurses in getting the chil-

NEW YORK CITY.



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THE WOOLWORTH BUILDING.  
(Cass Gilbert, Architect.)



NEW YORK CITY.



The New Municipal Building. The City Hall in the Foreground.





## NEW YORK

dren through a rear door to a place of safety, the building was burned to the ground. After this the mob attacked another enrolling office at 1190 Broadway, near 28th Street, with the resultant firing and pillage of most of the shops in the neighborhood. A cry now went up to kill the police, and soon 5,000 rioters, so rapidly had the mob swelled in numbers, were marching down Broadway, bent upon the destruction of police headquarters in Mulberry Street. Thomas C. Acton, president of the police board, informed of the rioters' purpose, detailed Sergeant Daniel Carpenter with 200 men to lie in wait for them. Carpenter marched his squad into Bleeker Street and so to Broadway, at the same time sending detachments up the nearest parallel streets east and west to strike the flanks of the oncoming mob. "Hit for their heads, men," were his orders. "Hit quick and hard, and take no prisoners." The fight that followed came soon to an end, and Broadway was cleared of rioters, save those that lay on the pavement with broken skulls. Routed at one point, however, the mob soon rallied at another, and a few hours later, under cover of darkness, a desperate attempt was made to sack and burn the office of the *Tribune* in Park Row. Here again the police did heroic service, and a charge led by Inspector George W. Dilks at the head of 110 men drove the rioters from the field with heavy loss in killed and wounded. Riotous feints meantime had been made upon the Seventh Avenue and Center Street arsenals and upon the armory at the corner of Second Avenue and 21st Street; the house of George Opdyke, mayor of the city, invaded and some of his furniture destroyed, and an attack made against that of Henry J. Raymond, editor of the *Times*, which had strongly supported the draft. It was clear at the close of Monday that the police force of the city was too small to cope with the lawless spirit. The mayor accordingly called on the State and Federal authorities for aid, and all of the New York regiments at the front were ordered to repair to the city. While this order was in process of execution the mob continued its work of firing and looting houses, and of maltreating and murdering unoffending negroes; but on the evening of Wednesday the returning regiments began to arrive in the city. With their coming, bayonets and bullets were substituted for policemen's clubs, and the rioters were attacked at every point with a resolute desire to do them harm. This wholesome policy, with a temporary suspension of the draft, quelled the rioting, and on Friday 17 July the mayor was able to announce the complete restoration of order. Two millions dollars' worth of property had been destroyed and over 1,200 rioters slain.

New York during the last 40 years has witnessed the assembling of but one mob which the police could not handle without the assistance of the military. That was in July 1871, when the Orange lodges of the city undertook to parade on the anniversary of the Battle of the Boyne. Announcement of their purpose evoked threats of violence from the Catholic Irish, and, fearing trouble, the governor of the State ordered five regiments of the National Guard to escort and protect the procession. Policemen were also detailed to surround and guard it. The point of departure was the corner of Eighth Avenue and 29th

Street, and at the appointed hour in the afternoon of 12 July the paraders began their line of march,—a detail of patrolmen in front, then a regiment and next the Orangemen, with a moving wall around them, and two other regiments bringing up the rear. Before they had moved two blocks a volley of sticks and stones from sidewalks, house-tops and windows rained upon Orangemen, police, and soldiery, many of whom were injured. Angered at this treatment, the members of one of the rear regiments, not waiting for orders, fired, some into the crowd and others at house-tops and windows. There was only one discharge, but 54 persons were slain. After this one deadly volley, police clubs and bayonets held some of the rioters at bay, while the greater number turned and ran as the reserve patrolmen along the line hastened to the scene. The remainder of the march passed without incident.

The political history of New York during the first half of the last century was a varied and turbulent one, but with a steady trend toward making the government democratic in all its branches. Until 1834 the mayor, as has been noted elsewhere, was chosen by the State council of appointment or by the common council of the city, which method of selection brought to the office such men as Edward Livingston, DeWitt Clinton, and Philip Hone. After 1834, however, the mayor was elected by the citizens, to whom in the meantime had been granted an unrestricted suffrage. A dozen years later the judiciary was also made elective, and thenceforth most local officers were chosen in the same manner. During this period the Democratic party was the one most often in power. The Federalists, or their successors, the Whigs and Republicans, now and then gained the upper hand; but in the long run the Democrats, under the leadership of Tammany Hall, a secret organization whose social and benevolent aims had been early put aside for political ones, always recovered their hold on the reins. The first mayor chosen by popular suffrage was a Democrat, and so were most of his successors prior to the Civil War. A Republican in 1862 succeeded to the office, but Tammany Hall soon regained control of the municipal government, and for several years political corruption ran riot in the city. Tammany Hall's master spirit at that period was William M. Tweed (q.v.), an able, but coarse and unscrupulous man, who following 1863 organized the politicians of his own party and a number of the local Republican leaders of the baser sort into a gigantic conspiracy to plunder the city. The Tweed Ring, as it was called, attained its greatest power in 1869, when it was master of every department, not only of the city, but also of the State government. Its greatest scheme of robbery was the building of a new court-house in City Hall Park. Work on this structure was begun under a stipulation that the cost should not exceed \$250,000, but before 1871 \$8,000,000 were expended on it, more than \$1,000,000 of this sum being traced to Tweed's pocket. The end came in 1871, when the *Times* exposed the operations of the ring. Then an aroused public sentiment compassed its defeat at the polls, and this was followed by the prosecution and imprisonment of the chief offenders, Tweed himself dying in a felon's cell.

The material prosperity of the city has in-

## NEW YORK—NEW YORK CENTRAL RAILROAD

creased steadily in the last 40 years. A chief factor in the making of the New York of to-day was the construction of the elevated railway system, completed in 1880 through the efforts of Cyrus W. Field. This brought all parts of the island within easy distance of each other, and the unbroken lines of city blocks which quickly followed in its wake wrought a complete transformation in the region in and about Harlem, formerly an isolated suburb reached only by horse-car or steamboat, but now as near the heart of trade as 14th or 42d street was in earlier years. More recently the cable-car and the electric trolley-car have ministered to the increasing need for rapid transportation, and the present year (1904) marks the completion of an underground railway system. The bridge across the East River, completed in 1883, having been found inadequate to the needs of an ever-growing population, a second has been built and two others are being thrown across that stream, while private enterprise is making ready to bind the Jersey shore to Manhattan by driving a tunnel under the North River.

The territorial expansion of New York has the while more than kept pace with its material development. By an act of the legislature passed in 1873, the corporate limits were carried across the Harlem, and a part of Westchester County, amounting to 13,000 acres, erected into city wards. A dozen years later a movement was set on foot to include in one municipality Manhattan Island, Brooklyn, part of Queens County, Staten Island or Richmond County, and yet another portion of Westchester County; and in 1890 a commission of eleven members, headed by Andrew H. Green, was appointed to inquire into and report upon the expediency of the project. The labors of the commission took shape in a bill passed by the legislature in 1894, which provided for the submission of the question to a vote of the people of the cities, towns and villages included in the proposed consolidation. The people gave their vote in November of the same year, and only the residents of Mount Vernon and the town of Westchester failed to record their approval. Meanwhile, by act of the legislature, West Chester, East Chester, Pelham, and Wakefield (or South Mount Vernon), were in June 1895 annexed to New York city, whereby another 20,000 acres were brought within the corporate limits, and Westchester township's vote against consolidation rendered ineffective. This carried the city line to the limit in Westchester County recommended by Commissioner Green and his associates, and in January 1896 a bill was passed by the legislature which made Kings County, a portion of Queens, and all of Richmond integral parts of Greater New York. The same year a commission of nine members was appointed by the governor to frame a charter for the new municipality and report the same to the legislature; and its labors had issue in a bill which on 5 May 1897 received the signature of the governor. This measure, which took effect 1 Jan. 1898, divides the city into five boroughs—Manhattan, the Bronx, Brooklyn, Queens, and Richmond,—embracing an area of a little less than 327 square miles, and counting a population in 1910 of 4,766,883. Thus, fulfilling its imperial destiny, has the village of 250 years ago become the second city in the world. Consult the publications of the

New York Historical Society; Wilson, 'Memorial History of the City of New York'; Lamb, 'History of the City of New York.'

RUFUS ROCKWELL WILSON,  
*Author of 'New York Old and New.'*

**New York, College of the City of.** See COLLEGE OF THE CITY OF NEW YORK, THE.

**New York Academy of Sciences, The,** was originally incorporated in 1818 under the name 'The Lyceum of Natural History in the City of New York.' The title was changed in 1876. There are four classes of members in the association: active, fellows, corresponding and honorary. Annals, memoirs and many pamphlets are published under the auspices of the society.

**New York Central and Hudson River Railroad Company,** the incorporate name of one of the great transportation systems of the United States. Having its beginning in 1826 as the Mohawk and Hudson Railroad with less than 20 miles of track and an equipment of but a single train, this remarkable railroad system, popularly known as 'the Four Track Road,' has resulted in the consolidation of over 100 small railroads, and in 1903 it operated as owner or lessee over 3,242 miles of track. In 1903 the New York Central carried 42,437,265 passengers, which required an equipment of 2,118 cars and 547 locomotives. In its transportation of freight during the same year the road employed 63,542 cars and 936 locomotives.

**The Beginning.**—The growth and development of the New York Central extending over the period from 1826 to 1904 is typical of American commercial progress. The genesis of the great corporation was the Mohawk and Hudson Railroad, chartered in 1826 and opened 12 Sept. 1831. It was the first railroad built in the State of New York. The name was changed a few years later to the Albany and Schenectady. Together with nine other small railroads the Mohawk and Hudson was merged into a corporation, organized under a special law, 2 April 1853, called the New York Central Railroad Company.

**The Central.**—The ten roads comprising the New York Central were: (1) the Albany and Schenectady; (2) the Schenectady and Troy, chartered in 1836, and opened in 1842; (3) the Utica and Schenectady, chartered in 1833, and opened in 1836; (4) the Mohawk Valley, organized in 1851; (5) the Syracuse and Utica, chartered in 1836, and opened in 1839; (6) the Syracuse and Utica Direct, chartered in 1853; (7) the Rochester and Syracuse, a consolidation of the Auburn and Rochester (1836), and the Auburn and Syracuse (1834); (8) the Buffalo and Rochester, a consolidation of the Tonawanda Railroad (1832) and the Attica and Buffalo (1836); (9) the Rochester, Lockport and Niagara Falls Railroad, organized in 1850; (10) the Buffalo and Lockport, chartered in 1852, and opened in 1854. This consolidation gave the New York Central a continuous line of railway from Albany to Buffalo. The following roads were subsequently leased and then merged into the consolidation: Rochester and Lake Ontario (1855); Buffalo and Niagara Falls (1855); the Lewiston (1855), and the Saratoga and Hudson River (1867).

NEW YORK CITY.



NEW YORK'S NEW TRANSPORTATION SYSTEM.

Sectional view looking north at the junction of Sixth avenue and Thirty-second street, showing five superimposed railway systems. The Pennsylvania, Rapid Transit Subway, Hudson Companies, Street Surface, and Elevated Railways.





# NEW YORK CITY.



A bird's-eye view of the Jersey shore opposite New York, showing arrangement of tunnels and connecting railroads. The lower McAdoo tunnel — the Hudson and Manhattan R. R. — runs from the old Pennsylvania station at Jersey City to Cortlandt street, New York, serving the Central Railroad of New Jersey, the downtown branch of the Pennsylvania and the Erie. The upper McAdoo tunnel — the New York and Jersey R. R. — runs across from about the Lackawanna Station in Hoboken to Morton street, New York, serving the Lackawanna. Both tunnels serve primarily the Jersey suburbs, electric subway trains passing through Bergen Hill. The Pennsylvania tunnels are for the Pennsylvania Railroad, the main line being diverted from above Newark, across country behind Bergen Hill and then through hill and under river at Weehawken to the new Pennsylvania terminal at Thirty-second street, New York. Several connecting railroads will enable passengers on the Central, the Erie, the Lackawanna and the West Shore to pass through New York for points in New England.



## NEW YORK CENTRAL RAILROAD

*The Hudson River.*—The Hudson River Railroad Company was chartered 12 May 1846. It leased the Troy and Greenbush Railroad, which was chartered in 1845, and in October 1851 opened the new Hudson River line through its entire length from New York city to East Albany. At this stage of the development there were the two consolidated systems, the Hudson River (New York to Albany), and the Central (Albany to Buffalo).

*The Consolidation.*—On 1 Nov. 1869, the New York Central and Hudson River Railroad Company was organized by the consolidation of the New York Central Railroad Company and the Hudson River Railroad Company. This gave a direct line from New York city to Buffalo. The new company added the following extensive roads to its system: (1) the New York and Harlem, chartered in 1831, and extending from 42d street, New York, to Chatham, included a lease of the New York and Mahopac Railroad from Golden's Bridge to Lake Mahopac. (2) The Spuyten Duyvil and Port Morris Railroad, six miles long, chartered in 1867. (3) The Geneva and Lyons Railroad, from Geneva to Lyons, distance 14 miles. (4) The Syracuse Junction Railroad, a local system. (5) The Buffalo Junction Railroad, between East Buffalo and North Buffalo. (6) The Troy Union Railroad, chartered as a terminal line in 1851, and originally owned by the city of Troy. (7) The two Hudson River bridges, owned by the Hudson River Bridge Company, and crossing the Hudson at Albany and East Albany. (8) The Dunkirk, Allegheny Valley and Pittsburgh Railroad, leased until 1873. (9) The West Shore Railroad. (10) The New Jersey Junction Railroad. (11) The Beech Creek Railroad. (12) The Rome, Watertown and Ogdensburg. (13) The Mohawk and Malone Railroad. (14) The Carthage and Adirondack Railroad. (15) The Gouverneur and Oswegatchie Railroad. (16) The New York and Putnam Railroad. (17) The Pine Creek Railroad. (18) The Syracuse, Geneva and Corning Railway. (19) The Fall Brook Railway. (20) The Wallkill Valley Railroad. (21) The Boston and Albany Railroad. Many of these consolidated lines were in themselves great railway systems and are worthy of brief historical sketches.

*The Boston and Albany.*—On 4 Sept. 1867, the Boston and Albany Railroad Company was formed by the consolidation of the Boston and Worcester Railroad Corporation and the Western Railroad Corporation, and later, 1870, the Boston and Albany Railroad Company consolidated with itself the Albany and West Stockbridge Railroad Company and the Hudson and Boston Railroad Company. Other roads going into the Boston and Albany were the Springfield and North Eastern, the North Brookfield, the Pittsfield and North Adams, the Ware River, the Providence, Webster and Springfield, the Chester and Becket. The entire Boston and Albany system was leased to the N. Y. C. & H. R. R.R. on 15 Nov. 1899 for a term of 99 years.

*The West Shore.*—The West Shore system was composed of the New York, West Shore and Buffalo and the Syracuse, Ontario and New York, under the name of the West Shore Railroad Company, and was leased to the N. Y. C. & H. R. R.R. Co., 5 Dec. 1885, for 475 years. This

lease was ratified by the New Jersey State Legislature.

*The Beech Creek.*—The Beech Creek Railroad Company was organized 29 June 1886, as the successor of the Beech Creek, Clearfield and Southwestern, chartered 1883, and extending from Williamsport, Pa., to the southern line of Clearfield County, a distance of 100 miles. This was leased to the N. Y. C. & H. R. R.R. on 1 Oct. 1890, for a period of 999 years.

*Rome, Watertown and Ogdensburg.*—In 1860 the Rome, Watertown and Ogdensburg Railroad was organized by the consolidation of the following roads: Watertown and Rome, Potsdam and Watertown, and subsequently added the Lake Ontario, the Syracuse and Northern, Windsor Beach and Ontario, Rochester and Lake Beach, the Norwood and Montreal, Fulton and Oswego, Syracuse, Phoenix and Oswego, Oswego and Rome, the Utica and Black River, the Clayton and Theresa, the Black River and Morristown, the Ogdensburg and Morristown, and the Carthage, Watertown and Sackett's Harbor. This system was leased to the N. Y. C. & H. R. R.R. on 14 March 1891.

*The Mohawk and Malone.*—This company was organized in 1892, by the consolidation of the Herkimer, Newport and Poland; the Herkimer, Newport and Poland Extension and the Saint Lawrence and Adirondack. This company's property was leased to the N. Y. C. & H. R. R.R.

*The New York and Putnam.*—Organized in 1892, this company represented a merging and consolidation of the New York and Northern; Yonkers Rapid Transit, New York City and Northern; New York, Westchester and Putnam; the West Side and Yonkers and the New York, Boston and Montreal. The system was leased to the N. Y. C. & H. R. R.R. on 30 Jan. 1894.

*The Fall Brook.*—This system included the Blossburg and Corning, the Wellsboro and Lawrenceville and the Cowanesque Valley, and was leased to the N. Y. C. & H. R. R.R. on 11 April 1899, for 999 years.

*The Dunkirk, Allegheny Valley and Pittsburgh.*—Organized 1 Dec. 1872, this system had been the result of a consolidation of the Dunkirk, Warren and Pittsburgh, the Warren and Venango and the Conewango Valley. It was leased to the N. Y. C. & H. R. R.R. in 1872 for a period of 501 years.

*The Directors.*—The directors of the N. Y. C. & H. R. R.R. at its organization in 1869, were Cornelius Vanderbilt, William H. Vanderbilt, Augustus Schell, Horace F. Clark, Daniel Torrance, Chester W. Chapin, James H. Banker, Samuel Barton, Joseph Harker, George J. Whitney, Samuel F. Barger, Wm. A. Kissam, and H. Henry Baxter. Of this original directorate the only survivor in 1903 was Samuel F. Barger. The directors in 1903 were Wm. K. Vanderbilt, Chauncey M. Depew, Frederick W. Vanderbilt, J. Pierpont Morgan, Charles C. Clarke, Wm. Bliss, H. McK. Twombly, Geo. S. Bowdoin, Samuel F. Barger, Wm. Rockefeller, D. O. Mills, W. H. Newman and E. V. W. Rossiter.

*The Presidents.*—The presidents of the N. Y. C. & H. R. R.R. Company have been Cornelius Vanderbilt, Wm. H. Vanderbilt, James H. Rut-

## NEW YORK CUSTOM-HOUSE — NEW YORK PUBLIC LIBRARY

ter, C. M. Depew, Samuel R. Callaway and William H. Newman, in the order named.

*Characteristics.*—The entire system of the N. Y. C. & H. R. R.R. consisted in 1903 of 1 main line, 2 contract lines, 13 branch lines and 59 leased lines and branches of railroad. It had a total mileage of 3,242.49; has 1,374 steel bridges, 136 stone bridges, 89 wooden bridges, 180 trestles, 33 tunnels, 8 grain elevators, a fleet of 205 barges, ferryboats and other vessels, and employed an army of 50,000 men, to whom \$33,000,000 are annually paid in wages. The lines of the company extend through the States of New York, Pennsylvania, New Jersey and Massachusetts.

In 1903, the New York Central owned large proprietary interests (through ownership of stock) amounting to \$115,267,134, in the Lake Shore and Michigan Southern, the Michigan Central, the Chesapeake and Ohio, the New York, New Haven and Hartford, and sundry other railroads.

**New York Custom-House**, in New York, perhaps the most imposing custom-house in the world. It occupies an entire block, irregular in shape, bounded by Bowling Green, Whitehall, State, and Bridge streets. The frontage on Bowling Green is 191 feet; on Whitehall Street and State Street about 288 feet; and on Bridge Street about 278 feet. It has seven stories above the sidewalk and two below, the entire cubical contents being about 8,400,000 cubic feet. Its cost was \$4,500,000. The exterior of the building is constructed of Maine granite, is monumental in design, and is richly embellished by carving and sculpture, by the most eminent sculptors in America. The architectural style is that of the Renaissance period. A few public rooms are specially decorated and finished in fine marbles, including the offices of the collector, the main halls, and also the central rotunda. The building is the finest custom-house in the world, both as a structure, and as an office for transaction of customs business.

**New York Historical Society**, The, an association organized 20 Nov. 1804, for the collection and preservation of historical matter relating to the United States in general and the State of New York in particular. The collections of the society are rare and valuable. In the department of antiquities is the Abbott collection of Egyptian antiques, which is considered one of the finest in the world. The art gallery, which contains nearly 1,000 paintings and 200 portraits, includes the Bryan gallery of old masters, the Durr collection, New York gallery of fine arts, and the works of the American art union. The library has a valuable collection of books, maps, manuscripts and engravings. From 1857 to 1903 the collection was housed in the society's building at 170 Second Avenue, New York. In November 1903 a new home for the society at 77th Street and Central Park West was dedicated and the historical treasures owned by the society have since been removed to the new building.

**New York Public Library**, established 23 May 1895 by a consolidation of the Astor, Lenox and Tilden libraries. Legally this was an amalgamation of three corporations known as the Tilden Trust, the trustees of the Astor Library, and the trustees of the Lenox Library. From these institutions 25 trustees were selected

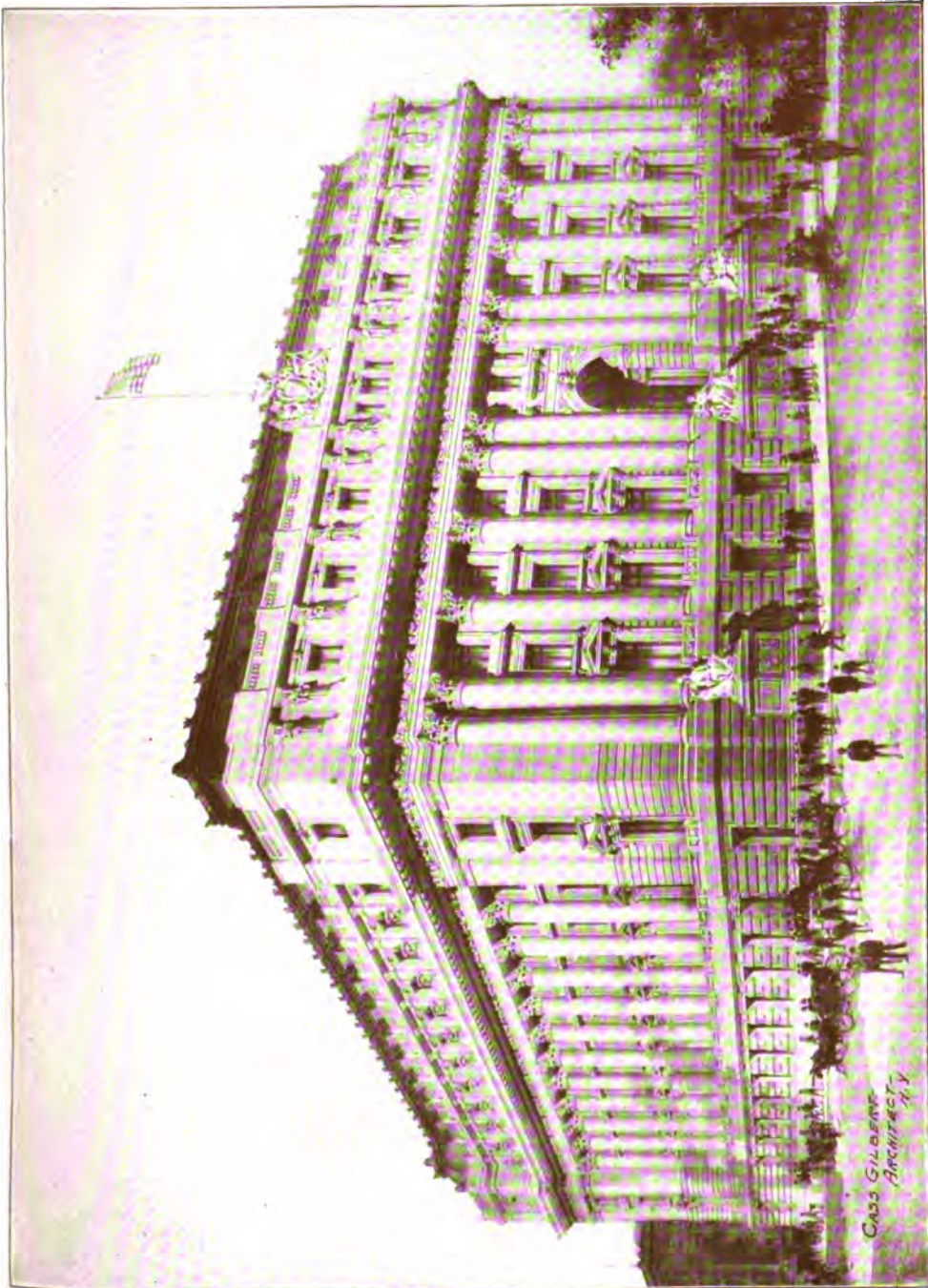
to serve as members of the new corporation. The agreement of consolidation provided for the establishment and maintenance of a free public library and reading room in the city of New York, with such branches as might be deemed advisable for the continued promotion of the objects and purposes of these several corporations. The Astor Library (267,000 volumes) was founded in 1849, by John Jacob Astor, and his endowment was increased, and land and buildings added, by the beneficence of various members of the Astor family. The Lenox Library (86,000 volumes) was founded by James Lenox, who gave land on Fifth Avenue, between 70th and 71st Streets, large funds and valuable collections of Bibles, manuscripts, and Americana. It received subsequently large endowments from his sister, Miss Henrietta Lenox, from Mrs. R. L. Stuart, and others. The Tilden Trust (20,000 volumes), incorporated in 1887, was created by the will of Samuel J. Tilden, made in 1884, which gave his entire residuary estate to trustees to establish and maintain a free library and reading room. A long contest in the courts resulted, before the termination of the suit, in an agreement of compromise by which the Tilden Trust became possessed of over \$2,000,000.

In addition to the main library the work is carried on in 42 branches, of which 33 are in Manhattan, 5 in The Bronx and 4 in Richmond. Administration of the circulation branches is conducted by the trustees in accordance with a contract entered into between the city and the library in 1891 and 1902. Prior to the opening of the new library building, the main branches, the Astor and the Lenox libraries, contained works for reference, and had no books for general circulation.

The trustees of the New York Public Library soon after the consolidation in 1895 determined to pursue a liberal policy and to create a great library system not only for the use of scholars, but for the people. The best permanent site for the future great library was considered to be in Bryant Park, on Fifth Avenue, between 40th and 42d Streets, on the site of the city reservoir, which had become obsolete and was practically unused. On 25 March 1896 the trustees made a formal address to the mayor asking aid from the city in securing the site of the reservoir, and in May 1896 the legislature passed a law authorizing the removal of the reservoir and the lease of the land to the library. On 19 May 1897, another act was passed providing for the construction by the city of a library building on the reservoir site, and for its lease to the library, which act was amended in 1900, removing the limit of cost. On 10 November, Carrère and Hastings were selected as architects for the new building, and, on 1 December, the plans were approved by the city. After delays, owing to the failure to appropriate funds for the work, the removal of the reservoir was begun on 6 June 1899 and the new building was opened to the public on 23 May 1911. Exclusive of the books and collections which it contains, it had been erected and furnished at an expense of about \$9,000,000, on ground valued at about \$8,000,000.

The new library building was not intended to be a great monumental building which would look as well from one point of view as an-

NEW YORK.



THE NEW YORK CUSTOM HOUSE.





## NEW YORK STATE UNIVERSITY

other and which would be fundamentally an example of pure architectural form. It is described by the architects as "modern Renaissance, more or less of the Louis XVI period, with such modifications as the conditions and needs of our age have suggested." The facade on Fifth Avenue has poise and character and seems to issue to the people "an invitation to enter rather than a command." The total quantity of constructive marble in the building is about 375,000 cubic feet, quarry measure. The general plan is rectangular, 300 feet long on the Fifth Avenue front. There are four floors besides the cellar. The sides and front are comparatively low, the top floor being lighted by windows and skylights; while the centre and rear parts, which are in the form of a T, rise much higher and are lighted entirely by windows.

Of the great libraries of the world, the New York Public Library is fourth in size, possessing approximately 2,000,000. It is notably strong in famous old manuscripts and rare editions: illuminated and Oriental manuscripts; works on American history and genealogy; the history of printing; books belonging in the Oriental, Hebrew, and Slavonic departments, and works on the history and illustration of ancient and modern art in all its phases.

It is in truth a great treasure house of ancient and modern learning, the character and importance of which can only be thoroughly appreciated by those who have constant occasion to use the library. Students from all parts of the country and indeed from all parts of the world are daily visitors seeking special information.

**New York State University.** The University of the State of New York is a State department and at the same time a federation of more than 1,900 institutions of secondary and higher education. Its object as defined by law is to encourage and promote education in advance of the common elementary branches; and this is accomplished through an organization embracing high schools, academic departments of union free schools, academies, colleges, universities, professional and technical schools, libraries, museums, study clubs, extension courses and similar agencies. Its government is conducted by 19 elective regents and four ex-officio regents, the governor, lieutenant governor, secretary of state and superintendent of public instruction. The officers of the University are a chancellor and a vice chancellor, who are regents, and a secretary, who administers the department, and has charge of the immediate supervisory work. The regents grant, alter, suspend or revoke charters, confer honorary degrees, appoint boards to examine candidates for admission to the professions, and distribute state funds to secondary schools and free public libraries. They exercise supervision over secondary institutions through a system of preliminary and academic examinations, combined with inspection, and over professional education through their power to admit qualified students to professional schools and state examinations, and license candidates who have met the State tests or otherwise proved their fitness to engage in practice. The annual meet-

ing is held the first Thursday in December, and other meetings as business requires. Since 1892 the regents have held 204 committee meetings and 43 full board meetings, the latter attended by an average of 14 members. In 1903 the appropriations for the department and the schools and libraries to which it apportions money were \$661,456.31, including the fund of \$350,000 for secondary schools. The University consists of six departments, Administrative, College, High School, Home Education, State Library and State Museum.

In 1754 letters patent were granted to a corporation under the name "Governors of the College of the Province of New York in the City of New York in America." Chapter 51 of the laws of 1784 vested all the rights, privileges and immunities of this corporation (then Columbia College) in the regents of the University of the State of New York, who were thereby "erected into a corporation or body corporate and politic, and enabled to hold, possess and enjoy" these rights, privileges and immunities, together with such other powers as were granted by this act. The original charter of the University authorized the regents "to found schools and colleges in any such part of this State as may seem expedient to them . . . every such school or college being at all times to be deemed a part of the University and as such subject to the control and direction of the said regents." At first the existence of the University was closely associated with that of Columbia College, and the idea of a governing board distinct from all teaching institutions but bringing all into vital relations with the State was attained somewhat later. In 1787 the incorporating act received important modifications, and the regents' powers took the shape which they have ever since possessed. The authorship of the University has been the subject of discussion, generally being ascribed to Alexander Hamilton; but the honor must be shared with James Duane and Ezra L'Hoummedieu, as well as other men who took part in the establishment of the institution in 1784 or contributed later to its final organic form. The name regents was naturally adopted for the administering body by men who had the English universities in mind while they were laying the foundation of an educational structure; but the scope of the regents' functions was early determined in an original direction by the needs and freer conditions of education in the American commonwealth.

From the beginning the supervision of courses of education in high schools and academies has been the chief function of the regents, the foundation on which the whole system of higher, professional and technical education rests. In 1784 New York had no system of secondary schools. Such schools now (1911) report 134,865 students and a total net property of \$38,604,686, with expenditures for the year of \$10,612,531.68, property and expenditures being thus divided between high schools and academies: high school property \$27,232,829, high school expenditures \$7,745,358.38; academy property \$11,371,857, academy expenditures \$2,867,173.30. The following table shows the growth in academies since 1870:

	1870	1880	1890	1900	1910
Academies.....	125	86	104	140	167

## NEW YORK UNIVERSITY

The regents are charged with the duty of administering the statutes which provide for the general education and special training of professional practitioners. In 1910 as the results of State examinations the Regents licensed 514 physicians, 8 osteopaths, 137 dentists, 27 veterinary surgeons, 605 registered nurses, 53 certified public accountants, and 9 optometrists. Under the exemptions of the various professional laws the Regents also licensed 76 physicians, 58 dentists, 5 veterinary surgeons, 66 registered nurses, 185 optometrists. The improvement of commercial education and of business schools has been stimulated by their influence and standards. In 1784 Columbia was the only college in New York State. Harvard had been founded in 1636, Yale in 1701, but no serious movement was made in New York in this direction till 1746. In 1910 the universities, colleges, professional and technical schools connected with the university system reported 33,792 students, 4,543 teachers, and a total net property of \$117,596,979, and expenditures for the year of \$16,209,642.40. In 1910 there were 11,152 students in colleges of liberal arts, 3,154 students in medical schools, 542 students in dental schools, and 4,037 in schools of engineering and technology. The total expenditure for elementary, secondary and higher institutions was \$72,520,858, and the expenditure for the public school system \$50,665,532.

The State Library and the associated Home Education department combine a number of education agencies, including the Library School, traveling libraries and pictures, extension classes and literary clubs. The total number of volumes in the library is 498,392. Tuition fees amounting to \$2,827.50 were collected in the Library School; \$2,347.21 traveling library fees and \$407.50 from other sources were received—a total of \$5,582.21 turned into the State treasury during the year.

The State Museum, which has developed from the natural history survey undertaken by the State in 1836, comprises departments in geology, mineralogy, palæontology, general zoology, entomology, botany and archæology; and is engaged in pure research and practical scientific experiment. Its collections, representing the investigations pursued under its direction, are extensive and valuable.

The University publishes numerous bulletins in education, history and science, which are widely circulated among students of the subjects.

JAMES RUSSELL PARSONS, JR.

*Formerly Secretary University State of New York.*

**New York University**, established in 1830 in New York city. The first steps toward the founding of the university were taken in December 1829, when nine prominent citizens of New York met to discuss the project of establishing an institution of higher learning in the city. Through their efforts the co-operation of various literary and scientific institutions was obtained, a standing committee was organized, and \$100,000 subscription raised, most of which was contributed in comparatively small sums. In 1830 the University Council was elected by the subscribers and the university incorporated in 1831. In 1832 the collegiate department was opened

for instruction. The ideals of the university were from the first most liberal; the address of the standing committee issued in 1830 stated three fundamental principles which have been consistently adhered to: (1) "The object of the University shall be to extend the benefits of education in greater abundance and variety and at a cheaper rate than at present they are enjoyed"; (2) "Persons of every religious denomination shall be eligible to all offices" that the University may never be under sectarian control; (3) Those attending the University shall pursue studies according to their own preference "having an unlimited choice of the branches taught in the institution."

The present organization of the University includes eight schools, besides the Summer School and the Woman's Law Class. These schools are: the University College (founded 1832), including the College Extension department; the School of Applied Science (1862); the Graduate School (1886); the University Law School (1835); the University and Bellevue Hospital Medical College (founded as the University Medical College in 1841); the School of Pedagogy (1890); the New York American Veterinary College (1899); the School of Commerce, Accounts and Finance (1900). The university senate comprises the deans of the Union Theological Seminary, the General Theological Seminary (New York city) and the Drew, New Brunswick, Catholic, and Jewish theological seminaries. The work of the University College, which had always been largely elective, was in 1894 arranged for the group system; since then the arrangement of groups has been altered, but the principle has been most satisfactory; the groups include the classical, the classical scientific, the Semitic language and literature, political science, philosophy, natural science, exact science, and medical preparatory. The work of the School of Applied Science is arranged on the same principle, the courses include civil, mechanical, marine and chemical engineering. The School of Pedagogy was the first university school to put professional instruction in pedagogy on the same plane with the professional university instruction in law and medicine; it was also the first school to establish degrees in pedagogy; but before its first degree was actually conferred the New York State regents gave the honorary degree of doctor of pedagogy. The Medical College in 1898 was consolidated with the Bellevue Hospital Medical College under its present name; in 1896 this college began requiring a four years' course for all students; this action was in advance of State requirements, as the State law making a four years' course obligatory was not passed till the next year. No university in the Eastern States has grown relatively so fast as New York University; within 20 years (1902) the number of students has more than trebled and the value of its property more than quadrupled. The period of its greatest growth has been since 1891, when a site for a new campus was purchased on University Heights, containing about 23 acres. The University College and the School of Applied Science were moved there in 1894, the summer school is located there, and the scientific work of the graduate school is also done there; the other departments, with the exception of the medical and veterinary, are at

## NEW YORK CITY.



### GIGANTIC TERMINAL STATION FOR THE HUDSON RIVER TUNNEL AT CORTLANDT STREET, NEW YORK.

The trains from Jersey City will enter Manhattan by the tube shown in the foreground. The single track will diverge into five tracks, which will swing to the left and enter a six-platform station below the large building shown in the background. This building, 22 stories high, will be nearly three times larger than any existing office building, and will house 20,000 people. Trains return to Jersey City by the tunnel shown at the left of building.





## NEW ZEALAND

Washington Square. Since that time the curriculum has been enlarged, two new schools besides the summer school have been organized, and the number of students steadily increased. The university organization has also been completed, and the various schools closely affiliated under the government of the University Senate. This senate consists of the chancellor, the deans of the various schools, one professor from each of the schools, and advisory members.

Among the buildings on University Heights the most notable is the library building. An adjoining colonnade, with museum below, is known as the Hall of Fame (q.v.). The library emphasizes the seminar rooms, of which there are eighteen, each with its stack room adjoining, the greater number of the books are in these seminar stacks; in 1905 there were 82,000 volumes. The total value of the university plant was over \$2,750,000, one of the most valuable educational plants in the United States. The students in 1905 numbered 2,524, the professors and lecturers and instructors 286.

**1. New Zealand**, a colony of Great Britain in the Pacific Ocean, 1,200 miles east of Australia, consisting of two principal islands known as North Island and South or Middle Island, besides Stewart Island south of Middle Island, and several small outlying islands. The group lies between lat.  $34^{\circ} 20'$  to  $47^{\circ} 30' S.$ ; long.  $166^{\circ}$  to  $178^{\circ} E.$  The length of the group, north to south, is about 1,000 miles; the maximum breadth 200 miles; it has a coast line of 4,500 miles; and an aggregate area of 104,751 square miles. North Island comprises 44,468 square miles, Middle Island 58,525 square miles, Stewart Island 665 square miles, total 103,658 square miles, the rest being divided among Cook and other islands in the Pacific Ocean, since 1901, officially attached to the colony. New Zealand is divided into nine provincial districts, of which four—Auckland, Taranaki, Wellington, and Hawke's Bay, are in North Island, and five—Nelson, Marlborough, Canterbury, Otago, and Westland, in South Island.

**Topography.**—New Zealand is one of the loneliest of civilized countries of any importance. The shortest sea voyage between its ports and those of Australia is a run of 1,200 miles. It is separated from the coast of Chili by 4,000 miles of open ocean, while north and south empty sea wastes stretch to the Antarctic and Polynesia respectively. The archipelago itself, when the voyager at length reaches it, stands boldly up, showing, as a rule, steep shores backed by a hilly or mountainous interior. The three main islands have a coast line of 4,330 miles. Long curving beaches of sand or shingle, backed by cliffs or sand-dunes, often extend for many leagues. But even where the hills do not thrust their sides or spurs into the surf, they are so seldom far away, and, on the east coast are usually so clearly visible through the bright atmosphere, that the first impression left by New Zealand is of a chain of half-submerged highlands, broken, precipitous and picturesque. When, as on the mid-east coast of the South Island, or on the west of the North Island, the shores themselves are low-lying and commonplace, the striking background catches the eye and redeems the land-

scape. It is, however, where the mountains meet the ocean, or where long sea-arms wind in among the ranges, that the coastal scenery is found, the fame of which has gone abroad. In many of the sounds of the southwest a combination of grandeur and soft loveliness is seen, exceeding in sublimity the sea-coast between Alaska and Vancouver, and in richness and color leaving the Norwegian fiords behind. Among inlets other than these, Cloudy Bay and Blind Bay in the South Island, and the Hauraki Gulf, the Bay of Islands, Wangaroa, and Hokianga are, perhaps, the more noted. Wellington, the capital, stands on a noble harbor, Port Nicholson. For commerce, the harbors of the colony are often less convenient than might have been looked for in a group so narrow and deeply indented. The southwestern sounds aforesaid give access only to uninhabitable Alps. From Martin's Bay northwards there is not a single port on the western coasts which is not hampered by a bar. Kawhia, the best of them, lies out of the way of settlement. Even on the east coast, Lyttelton, Port Chalmers, and Napier, the third, fourth, and sixth ports of the colony, have had to be improved at great cost, and the same is the case with Bluff Harbor, the port of departure at the south end of the country, and with Westport and Greymouth, where most and the best coal is shipped. The truth is that many of the deep, sheltered gulfs are not just where traders would wish to have them. Fortunately, Wellington and Auckland are exceptions, and these have become the two chief ports of New Zealand.

The official area of the colony is 104,751 square miles. This includes not only the smaller coastal islands of New Zealand proper, but outlying groups like the Chathams to the east, the Aucklands to the south, and a number of Polynesian islets (the chief of which are the Cook cluster and Niue), which politically belong to the colony. Of the whole area, the North and South Islands cover all but about 2,000 square miles. In size as in configuration and climate, New Zealand may be more fairly likened to Italy and Sicily than to the British Islands. Long mountain ranges form a backbone, stretching — save for the gap made by Cook's Straits — from Puysegur Point at the extreme southwest of the South Island to the East Cape and the Bay of Plenty in the North Island. Between latitudes  $43^{\circ}$  and  $46^{\circ}$  the summits rise into the region of eternal snow. Several of them reach heights of between 10,000 and 12,000 feet, and Aorangi (Mount Cook), the highest peak in the islands, attains 12,349 feet. Here are glaciers, which on the western slopes descend and penetrate the evergreen pine and beech forests, while on the eastern side their size surprises geologists and mountain climbers. Some of the figures showing their extent are these:

Name	Area of Glazier	Length of Glazier	Greatest Width	Average Width
	Acres	Miles ch.	Miles ch.	Miles ch.
Tasman .....	13,664	18 0	2 14	1 15
Murchison ..	5,800	10 70	1 5	0 66
Godley .....	5,328	8 0	1 55	1 3
Mueller .....	3,200	8 0	9 61	0 50
Hooker .....	2,416	7 25	0 54	0 41

## NEW ZEALAND

Among these ranges lie seven large and many small lakes. They vary greatly in beauty, but Wakatipu, Manapouri, and the western arms of Te Anau challenge comparison with the lakes of Switzerland.

North of the 43d parallel the mountains, though somewhat less in height, are no longer a backbone merely. They extend right across the island, and the seaward flank of one fine double range, the Kaikouras, towers above the eastern coast. The broken and difficult surface of the northern end of the South Island has had a marked effect on the course of settlement and politics. Southward from the Kaikouras population is growing fairly dense along the eastern and southeastern coast as far as the district served by Bluff Harbor. In this stretch is found the largest flat plain—Canterbury—in the islands, and many roomy valleys, flats, and manageable slopes. The open, grassy character of the land made rapid occupation easy. Two-fifths of the population of the colony are to be found between the points last named, within 40 miles of the coast. To the north, however, settlement is still thin and patchy; the southern railroads stop 80 miles short of Cook's Straits; the southern provinces communicate with Wellington by a line of steamships from Lyttelton, halfway down the South Island. As if to separate the bulk of the North Islanders still more from the majority of the Southerners, Nature has made the butt end of the North Island, for 30 miles behind Wellington, poor, wind-beaten, and hilly. Only after leaving this unattractive knuckle-end do we come to fertile expanses on both sides, and in a central hill-encircled plain, the Wairarapa. Except in the east round Napier, on Hawke's Bay, very little of this attractive country is a dead level. Rolling downs, steep hills of moderate height, narrow, rich river-valleys, mark it everywhere. Great tracts of it are, or were, clothed with thick forest, the rest mainly with tall bracken. Generally the note within 40 miles of the coasts is fertility. A green, moist, warm land more suited, as a rule, for pasture, spreads along the west coast as far north as the mouth of the River Waikato, and on the east to the mouth of the Rangitaiki, on the Bay of Plenty. The centre of the island is a plateau of from 1,000 to 2,000 feet in height, lying round Lake Taupo, and dominated by volcanic cones, of which several are active and others have exploded within man's memory. Ngauruhoe (7,550), and Ruapehu (9,008), are the most restless of these. The most beautiful rises, not on the plateau, but out of the plains by the western shore. It is the solitary, symmetrical Egmont, and is 8,250 feet high. A line drawn through Ruapehu northward to White Island, in the Bay of Plenty, passes through a tract of about 650 square miles incessantly disturbed by volcanic activity. Warm or boiling springs, geysers, pools of boiling mud, fumeroles, solfataras, colored lakelets are numerous. Cold lakes and waterfalls add to the picturesque and the healing powers of the thermal waters, and complete the attractions of a much visited district.

In and near this volcanic territory the soil is mingled with pumice, and is not suitable for grass, though trees and long-rooted plants may do well there. South of Lake Taupo, and east

of the great volcanoes, a patch of true desert is encountered. Bordering on the comparatively barren pumice area is found both to the east and west the fertile country already referred to. Here the usual formation is that locally called *papa*. This is a calcareous stratum resembling soft limestone, and the fertility of even the most broken hilly surfaces of the *papa* districts was attested by the fine trees and tall bracken which usually covered them. These are now giving way to the artificial grasses of the colonists.

The deep, richly clothed gorges cut by the rivers of these districts supply the most romantic river scenery of the islands, notably in the valleys of the Wanganui and the Mokau.

North of latitude 38° the island narrows into a long peninsula, indented again and again, and well nigh cut in twain where the Waitemata (the harbor of Auckland City) almost meets the Manukau. In this northern Division the climate of the east coast differs little from that of the west, for there is no central spine; save on the hills, frost is rare; north of the 38th parallel, indeed, the mangrove fringes the shores, and palms, olives, oranges, guavas, and the cane-brake flourish. Here is the home of the giant Kauri pine, and here are the swamps and hillsides from which is dug the fossil resin, the kauri gum of commerce. The ocean is too near at hand, and too cool for the northern peninsula to be oppressively hot, and, were its soil everywhere fertile, it might be more thickly settled than any other province. Unluckily its strips and spots of rich alluvium are surrounded by larger tracts of stiff clay-marl, only productive after intense and skillful cultivation.

In New Zealand it is the western coast which is the wetter, milder, more luxuriant clothed side. On the eastern, large tracts were found by the whites, quite treeless and clothed with coarse tussock grass. Here pastoral settlement made a beginning, spreading rapidly into the central ranges, to be checked in the South Islands by the forests of the saturated west. In the North Island the climatic distinction is less marked, and there the grazer flourishes in the west, after the native vegetation has been burned away.

*Rivers.*—Most of the very numerous rivers show the characteristics of mountain torrents, the rapidity, and the cold, pure water running low in summer and disturbed by sudden turbid floods. It says much for the rainfall that very few streams run dry at any time. The volume of water in many is remarkable, notably in the chief river of the South Island, the Clutha, which, despite its strength, is but 154 miles long. In the north, the Waikato is the longest stream in the colony, and that, and four or five others (in the Auckland and Wellington provinces), are navigable by small steamers. Generally the rivers hinder rather than help traffic, though their swiftness and number make them very valuable in furnishing power for machinery.

*Climate.*—The yearly rainfall varies from 26 inches on the littoral of Canterbury, to 170 inches among the sounds of the southwest. Throughout the settled districts the average is about 35 inches on the eastern, and 60 inches on the western side. The brisk seawinds keep

NEW ZEALAND—NATIVE TYPES.



MAORI KING AND QUEEN — WAITAKA TRIBE.



## NEW ZEALAND

the sky normally clear, and the amount of sunshine registered is large, except in the south-west, and immediately inland of Mount Egmont. In a country stretching through 13 degrees of latitude the climate naturally is very varied, but generally is very healthful. In the northern peninsula of North Island the conditions are semi-tropical, while in the high lands of Otago and Southland the frosts in winter are very severe, and the summer bracing and temperate. In Wellington, which may be taken as the centre of the colony, the temperature scarcely ever falls more than one or two degrees below freezing point; while in Auckland, the most northerly of the large cities, the heat is tempered by sea breezes, and never reaches the intensity which makes life in summer so trying in the great Australian cities. Rapid changes of temperature are caused by sudden shiftings of wind, and are somewhat trying to new arrivals in the country.

**Geology and Mineralogy.**—To the geologist the two large islands are a continuity, and form the remnant of a continent which once extended eastward and was probably connected with South America. A great leading range of Palæozoic rocks stretches through both islands, branching out in the south to enclose the extensive schistose area of Central Otago. Upper Mesozoic formations have also enormous development; and in the North Island their outcrops are distinguishable through the volcanic deposits which cover a good part of the surface. In this island are also extensive areas of hydro-thermal agency, marking the expiring activity of volcanic outbursts. So late as 1886 there was a violent eruption of Mount Tarawera in the Hot Lake District, during which the celebrated Pink and White Terraces of world-wide fame as natural wonders disappeared; it was previously supposed to be an extinct volcano; Mount Tongariro and Ngauruhoe, in the heart of the island, also are still active. Sedimentary rocks, chiefly of gray sandstone, are often seen, both among the ridges of the interior, and on the coast, where they frequently form precipitous cliffs; but the far greater part of the rocks are crystalline. Among a great variety of fossils the most notable are those of a gigantic bird, the Moa (*Dinornis giganteus*), which survived down to recent times. New Zealand is extremely rich in mineral deposits, and gold mining forms one of its staple industries. Gold was first discovered in 1853, and the total value of the output to the end of 1904 was £65,136,648. The great gold producing regions are the Thames district of Auckland, the west coast of the South Island, and the interior of Otago. During the last few years the method of raising gold by dredging the beds of rivers has developed to a remarkable extent. The extensive coal measures are also a source of wealth. Among many varieties the best is the bituminous coal of the west coast of the South Island, which is equal in quality to that found in any part of the world. The output has been steadily increasing, and for 1905 amounted to 1,585,756 tons. Copper, chrome ore, manganese ore, sulphur, and other minerals have been worked with varying success. Working miners make good wages, and there is a good deal of independent prospecting. Mining schools have been established in different parts of the colony, and the

study of mineralogy is pursued with considerable zeal.

**Flora, Fauna, etc.**—Among vegetable productions the most characteristic are the ferns (130 different species), which form almost the only vegetation over immense districts. Some of them are more than 40 feet high, and remarkable for the elegance of their forms. The flax plant furnishes an article of export. A number of the forest trees furnish valuable timber, among them the rare kauri or damar pine. Flowering plants are remarkably scarce, save in the Alps, and there are no indigenous fruits.

In animals New Zealand is singularly deficient, only a sort of dog, now extinct like the moa, a rat, and two species of bats, being indigenous. Rabbits have been introduced and have multiplied so as to become a perfect pest; pigs now run wild, as well as cats. Pheasants, partridges, quails, and red and fallow deer have been successfully introduced, also the brown and rainbow trout. All the common European quadrupeds appear to be easily acclimated. Pigeons and parrots are the most common native birds. Among others are the apteryx (a wingless bird), the huia, the tui, or parson-bird, and the owl-parrot. The chief reptiles are a few lizards. The coast waters teem with fish, and seals are still numerous in some parts.

**Population.**—The population is now about 950,000, or 8½ to the square mile. It is still very scanty in the western half of the South Island; in the interior of the North Island between latitudes 40° and 38°; in the great shoulder between Hawkes' Bay and the Bay of Plenty; and in the far north of the Auckland peninsula. Elsewhere it is steadily spreading over the land up to a height of about 1,500 feet above sea-level. The advance, however, has never been rapid. The warlike native tribes, from whom land has had to be acquired by tedious purchase, have not been the only obstacle. To the difficulties of the stiff clay-marl and pumice soils must be added the denseness of the forest, the oft-recurring hill and mountain barriers, and the innumerable ravines and swift torrents, making roads and bridges very costly. Furthermore, a small archipelago placed in the southern ocean to be a lonely outpost of civilization does not attract any full stream of immigrants from Europe. So, 21 years after annexation the white population had reached but 99,021. In 1881 it had attained to 489,923. In 1891 it was but 626,650. The colored population estimated at 45,000, has been stationary for many years. The Maori and Polynesians do not increase. The Chinese, who in 1881 numbered 5,000, have been reduced to 2,500 by exclusion laws—modified copies of those of the United States. The official census of March, 1901, returned a population of 815,862 persons, or, excluding Maori and Polynesians, 772,719. The latter number had risen by 29 April 1906 (the date of the latest census) to 888,639, an increase of 115,920 in five years and one month. Of the whites, 471,055 were males and 417,584 females, in 1906. An excess of males over females is also found among the Maori, while among the Chinese only 71 females were enumerated in 1906. The increase by excess of births over deaths is satisfactory. This is mainly due to the extraordinarily low death-rate which, contrary



## NEW ZEALAND

to predictions, does not rise, and remains the lowest of any civilized country. In 1905 the death-rate stood at 9.46 in the thousand, as compared with a birth-rate of 27.22. The excess rate in favor of life, is therefore, 17.66, and takes a high place in the tables of international vital statistics. During the 12 years, 1880-1892, the birth-rate fell rapidly from 40.78 to 27.83. The fall then grew much slower, though it continued until 1899, when the rate stood at 25.12. Since then it has gradually recovered 2. The proportion of children to each marriage is now 3.22, as against 5.01 in 1885. The marriage-rate was 8.28 in 1905. The percentage of illegitimate births was 4.57. There can be no doubt that the decline in the birth-rate was almost entirely due to the deliberate limitation of families by potential parents. It is believed that the Maori tribes mustered about 65,000 at the time of annexation. Their decrease since has been mainly due to the prevalence among them of tuberculosis and venereal diseases.

The movement of the white population since 1901 is given in the following table:

Year	Estimated population on 31 December (excluding Maoris and for annexed Pacific Islands)	Increase during Year		
		By excess of births over deaths	By excess of arrivals over departures	Net increase
1901	787,657	12,857	6,522	19,379
1902	807,920	12,280	7,912	20,192
1903	832,505	13,301	11,275	24,576
1904	857,539	14,671	20,355	25,026
1905	882,462	15,021	9,302	24,323

Between 1870 and 1885 the gain by immigration was relatively large; but in the seven years, 1885-1891, the colony actually lost 20,000 people, mainly to Australia. Beginning in 1892 there has since been a gain amounting in all to 74,602. Two-thirds of this has come from Australia, and the remainder from Great Britain. The excess inflow from the Mother Country is steady but small, fluctuating between 2,000 and 3,500 a year. The Government encourages certain classes of emigrants, notably farmers, farm laborers, domestic servants, and navvies, by paying part of their passage money. An assisted immigrant can now travel from London to Wellington for £10. Exclusion laws have been passed to shut out criminals, prostitutes, lunatics, aged paupers, and the diseased or crippled. In addition to the landing tax of £100 on Chinese the Government reserves the right to subject non-British incomers to a language test. Apart from those relating to Chinese and disease it cannot be said that all the restrictive regulations are stringently enforced. The colony relies mainly on its distance from large centres, the cost of the voyage to it, and the smallness of its quiet towns. It offers few attractions to active criminals, and is too remote for paupers.

The proportion of females to every 100 males in New Zealand was 70.52 per cent. in 1871; 88.26 in 1891, and 90.33 in 1901.

The Church of England claims 40.84 per cent. of the people. The proportion of Presbyterians is 22.87; Roman Catholics, 14.23; Methodists, 10.86. Jews number 1,611. Excluding these last and the Chinese, the number of persons professedly non-Christian does not appear from the census to exceed 30,000.

The proportion of British descent is over-

whelming. At the census of 1901 the birthplaces of 772,277 New Zealanders were ascertained. Only 11,615 persons had been born outside the Empire. Of the white foreigners, by birth or descent, then in the colony, a considerable majority were of Teutonic or Scandinavian blood. Compared with Australia, New Zealand has a larger strain of Scottish and a smaller stain of Irish blood. In 1901 67 per cent. of the population were New Zealand born.

**Chief Towns.**—New Zealand is a decentralized country. Its main centres of population are the four towns of Auckland, Christchurch, Dunedin, and Wellington. Of these Auckland is the largest as it is the most beautiful, while Wellington, the political capital, disputes the hindmost place with Dunedin. Wellington, however, is overhauling its rivals. No other first-rate harbor is found on the North Island within 500 miles of the capital. It is the financial and banking centre of the islands and the rapid expansion of its sea-trade suggests that it may yet challenge Auckland's leadership. Auckland taps the grazing and dairying valley of the Waikato, the quartz goldfields of the Thames, Coromandel, and Waihi, and conducts a trade with the South Seas as well as with Australia. Christchurch is the market-town of the chief agricultural district, and is something of a manufacturing as well as an educational centre:

POPULATION OF FOUR CHIEF TOWNS WITH SUBURBS.

	March, 1901 (census).	April, 1906 (census).	
Auckland	67,226	82,189	93,544
Wellington	49,344	62,844	73,697
Christchurch	57,041	67,862	76,700
Dunedin	52,390	56,024	61,279

Christchurch lies inland, about five miles from its sea-port, Lyttelton. The other three towns are seaports though most of the shipping trade of Dunedin is done by Port Chalmers, seven miles from the city, and outside its ring of suburbs.

Wellington, close packed between steep hills and sea-shore, is already complaining of congestion, high rents, and the lack of garden-space. The other towns are roomy and comfortable enough, with well-planted, neatly-kept suburbs and spacious recreation grounds. There are no sky-scrapers and no slums. Wood is still the chief material in dwelling-houses, and the ratio of inhabitants to each house is 4.82. The architecture is commonplace; the rectangular streets fairly wide; the paving respectable; the hotels unpretentious, but clean and moderately cheap; the theatres small; the telephonic and telegraphic conveniences cheap and good. Electric tramways are now found in the chief towns. Drainage and sanitation are excellent. Each of the four towns has two or three daily newspapers very like decent English journals of the second rank. New Zealand, indeed, is a land of newspapers, for its journals of all sorts and sizes number 204.

**Liquor Laws.**—The consumption of liquor—chiefly beer and spirits—is not relatively high, nor is drunkenness especially prevalent. From the year 1881 to 1895 the consumption per head steadily diminished. From 1896 to 1904 it as steadily rose again, with the improving prosperity of the colony. The liquor-bill, which was £2,265,900 in 1895, swelled to £3,152,849 in 1904 and was still £3,120,705 in



1. View of Auckland, from Ponsonby.

2. Art Gallery, Public Library, and Municipal Buildings, Auckland.



## NEW ZEALAND — INDUSTRIES AND FINANCE

1905. The charges of drunkenness in the police-courts rose from 4,676 in 1895 to 8,057 in 1901 and 9,615 in 1904. This is the more noteworthy because since 1893 a drastic local option law has been in operation, under which the selling of liquor has been stopped in six districts, while the licensed houses of the Colony have been reduced in number from 1,715 to 1,350. The strength of the Temperance Party, also, is more than considerable. At the local option polls held on 6 Dec. 1905, 198,768 persons voted for prohibition against 182,884 for the continuance of licenses. For reduction of the number of licenses—an alternative permitted by the local option law—151,057 votes were cast. The police obtained 151 and 113 convictions against sly grog sellers in 1903 and 1904 respectively.

WILLIAM PEMBER REEVES,  
*High Commissioner for New Zealand in London.*

### 2. New Zealand — Industries and Finance.

**Agriculture.**—The Colony's founders looked forward to making it an agricultural settlement. Even now, however, it remains mainly devoted to grazing and mining. The deliberate State encouragement of small as against very large holdings of land has not substituted tillage for grazing. The small farmer is a dairyman more often than not, or he owns a few hundred sheep, and develops mixed farming. Wool is still the chief export, with frozen meat second. Next comes gold, with butter and cheese fourth. After them follow hemp, kauri gum, and tallow. Oats take a good place in some years as in 1902, when the value shipped was £761,000. Or they may fall low, as in 1904, when the value exported was but £185,000, and 1905 when it was even less. Wheat, like coal, goes almost entirely into local consumption, though 9,000,000 bushels were grown in 1905.

The same may be said of barley,—1,128,000 bushels in 1905,—and maize,—490,000 bushels. Yet as already stated the country is well adapted for cereal-growing. During the last 14 years the average yield of wheat has only once fallen below 20 bushels an acre and in 1905 it was 35.36. In the same year the average yield of oats was 42.53 bushels an acre; of barley, 38.26. A large acreage under root-crops—632,000 acres in 1905—is mainly an adjunct of meat-freezing. The roots are used for fattening sheep and lambs for export.

It was the fall in the price of cereals followed by the discovery of the use of refrigeration applied to the transport of food products which turned New Zealand farmers from cereals to meat, butter, and cheese. They found that artificial grasses,—cocksfoot, timothy, clover, rye-grass—would grow admirably in the islands, carrying and fattening far more stock than the native pastures. They began the process of laying down land in artificial grasses, with which 14,000,000 acres are now clothed. The export of frozen meat dates from 1882, when 1,707,328 pounds were sent to London. The rapidity of its growth may easily be shown:

#### MEAT EXPORT.

Year.	Lbs.
1885.....	33,204,976
1890.....	100,934,756
1895.....	127,018,864
1900.....	205,621,072
1905.....	191,054,912
1908.....	237,473,936

Butter and cheese began to be sent across the sea in 1889, and has been exported regularly since, mainly to the United Kingdom. The increase in the case of butter has been large and continuous:

#### EXPORT OF BUTTER.

Year.	Cwts.
1890.....	34,816
1895.....	57,964
1900.....	163,871
1905.....	305,662
1908.....	229,971

Cheese has advanced in 18 years from 26,558 cwts. to 88,776 cwts.

One of the two products much of which goes to the United States is the fibre of the native flax, the New Zealand hemp of commerce. The export of this has increased of late years (from 13,251 tons in 1900 to 28,209 tons in 1905). The price fluctuates with the prices of manila and sisal. In a year when prices are firm it will fetch £30 or £31 a ton in London. The value of the export in 1905 was £730,803.

**Minerals.**—So far, the only three minerals exploited in a large way, have been gold, coal, and kauri gum. Good bituminous coal, also brown coal and pitch coal, is found in many districts, notably on the west coast of the South Island, in Otago and Southland, and in the valleys of the Waikato and Mokau. The bituminous coal of the west coast is equal to any in the world and is used by the British Navy in the Eastern seas. The cost of the coal, however, keeps down the export which, beyond that taken by ocean-going steamers for their own consumption, is but 56,000 tons. In the domestic market, the local mines hold their own well and the total output though still small increases steadily as the figures below show:

Year.	Tons.
1880.....	299,923
1885.....	511,063
1890.....	637,397
1895.....	726,654
1900.....	1,093,990
1905.....	1,585,756

The total value of the gold produced since the year 1853 up to the end of 1905 was £67,230,584. For some years the average annual yield has been £2,000,000. The greater part of this is now extracted from quartz. The chief mine is the Waihi, from which, in 1904, £600,000 was obtained. In that and many other mines the cyanide process of extraction or separation is used. About one-fifth of the gold is obtained by dredging, chiefly in the river beds of the South Island. In all about 10,500 persons are engaged in gold mining.

The yield of silver has been inconsiderable, amounting to about three-quarters of a million sterling in 53 years.

The average value of the kauri-gum export is roundly half a million sterling a year. Though it is a monopoly, the price fluctuates considerably. In 1903, for instance, it averaged £67.8.11 while in 1904 it fell to £54.10.7. Almost all of it is sent to London or the United States, where it is chiefly used in the preparation of varnish.

Iron ore is found in abundance, but has not yet been turned to commercial account. In May 1906 a petroleum spring was tapped near New Plymouth from which oil flowed at the rate of 100 barrels a day.

# NEW ZEALAND—INDUSTRIES AND FINANCE

**Trade.**—In proportion to population the external trade is large, amounting as it does to £32 a head, after excluding specie. This is the more remarkable as there is virtually no transit trade. The imports are for local consumption only; exports represent local production. Up to 1886 imports exceeded exports; since that year the position has been reversed as the following table will show. Exports are almost entirely raw material, food, gold, and kauri gum. But much of the material and food goes through certain processes of manufacture or preparation before leaving the Colony.

TWENTY YEARS OF TRADE.

Year.	Imports (excluding specie).	Exports (excluding specie).	Excess of ex- ports over im- ports (exclud- ing specie).
1886.....	£6,319,223	£6,334,513	£15,290
1887.....	6,064,281	6,680,772	616,491
1888.....	5,430,050	7,403,206	1,973,156
1889.....	5,980,583	9,183,954	3,203,371
1890.....	5,998,895	9,569,316	3,570,421
1891.....	6,431,101	9,560,859	3,129,758
1892.....	6,742,544	9,490,920	2,748,376
1893.....	6,404,779	8,680,845	2,276,066
1894.....	5,990,177	9,221,550	3,231,373
1895.....	6,115,953	8,518,119	2,402,166
1896.....	7,035,379	9,299,907	2,264,528
1897.....	7,994,201	9,741,222	1,747,021
1898.....	8,211,409	10,449,838	2,238,429
1899.....	8,613,656	11,923,422	3,309,766
1900.....	10,207,386	13,223,258	3,015,872
1901.....	11,353,416	12,869,810	1,516,394
1902.....	10,958,038	13,635,459	2,677,421
1903.....	12,075,959	14,971,926	2,895,967
1904.....	12,900,030	14,738,750	1,838,720
1905.....	12,816,691	15,655,947	2,839,256

The trade is still chiefly with Great Britain, Australia, India, and the British Colony of Fiji. The distribution in 1905 was as follows: 83.47 per cent of the imports and 93.76 per cent of the exports representing trade with British possessions.

IMPORTS IN 1905.

From British Possessions.	Value.
United Kingdom.....	£7,785,084
Australia.....	1,815,717
Pacific Islands.....	466,361
Africa.....	559
Asia —	
Bengal.....	294,933
Ceylon.....	179,809
Other.....	59,073
America.....	96,527
Total British.....	£10,698,063
“(1908).....	14,780,276

Foreign.	Value.
Europe —	
Germany.....	£277,467
Belgium.....	80,130
Other.....	163,827
America.....	1,437,025
Africa.....	955
Asia.....	117,748
Pacific Islands.....	41,476
Total Foreign.....	£2,118,628
“(1908).....	2,691,008

EXPORTS IN 1905.

To British Possessions.	Value.
United Kingdom.....	£12,087,818
Australia.....	2,295,179
Pacific Islands.....	49,577
Africa.....	174,543
Asia.....	18,780
Total British.....	£14,679,620
“(1908).....	15,558,301

Foreign.	EXPORTS IN 1905.	Value.
Europe.....		£106,315
America.....		727,406
Africa.....		10,624
Asia.....		11,349
Pacific Islands.....		120,633
Total Foreign.....		£976,327
“(1908).....		759,193

It will be seen that the United States and Germany almost monopolize such foreign trade as there is. A Preferential Trade Act passed in 1904 imposed special duties of from 20 to 50 per cent on many foreign imports in the hope of transferring trade to Great Britain, but the effect of the law, though appreciable, is not yet large.

**Manufactures.**—The chief manufactures are meat-freezing, butter and cheese-making, tanning and wool-scouring, engineering, saw-milling, clothing, boot and shoemaking, printing, flax milling. The number of establishments—omitting all government workshops—are officially given as 2,459 in 1896, and 3,163 in 1901. The total approximate value of the land, buildings, machinery, and plant used in the year first named was £5,796,000. The sum rose to £7,959,631. The returns, however, especially of the first named year, are incomplete. The same criticism applies to the official estimates of the number of hands employed in factories and workshops. The official figures in by-gone years were taken on a different system to the present. It is probably very nearly correct to say that 30,000 hands were employed in factories and workshops of all sizes, State and private, in 1891, against 33,000 in 1895; 55,000 in 1900 and 72,000 in 1906. The value of the manufactured output is officially given at £17,000,000 for the year 1900, and as having increased by £7,591,000 since 1895. But both calculations must be taken subject to some deductions. All that can safely be affirmed is that the advance in manufactures during the 10 years, 1896–1905, has been rapid, while in the previous decade it was slow.

**Railways.**—As late as 1870 there were but 46 miles of railway open for traffic. This had grown to 2,490 miles in 1906, of which all but 84 miles were owned and worked by the Government. The number of passengers carried on the State lines in 1905–6 was 8,826,382 weight of goods carried, 4,415,166 tons; total revenue for year, £2,349,704; percentage of working expenses to revenue, 69.00. Owing to the physical divisions, broken surface, and small population of the Colony, the railway system is difficult to manage cheaply. Public opinion demands safety, comfort, low freight charges, and good pay and short hours for employees. All these desiderata are obtained. But, after paying working expenses, the return of revenue is but 3.3 per cent on cost of construction.

**Government Undertakings and Labor Legislation.**—As landlord, railway, telegraph and telephone operator, and constructor of public works, the State is a considerable employer of labor. But though the Government does most of the business of land transfer, and conducts that of life, accident, and fire insurance, is the chief trustee of intestate estates, and works two coal mines, it does not systematically compete with private enterprise. It does, however, regulate and supervise industry to an extent unsurpassed



in any other democratic and civilized country. The Department of Agriculture disseminates information, inspects flocks and herds, slaughter-houses, and dairy factories; examines, grades, and brands food products and certain other exports. Its work is believed to be honestly and efficiently done. The Department of Labor inspects all factories, workshops, and retail shops, however small, and controls servants' registry offices, even fixing the scale of fees that these last may charge. A Shop Hours Act restricts the business hours of retail shops and the working hours of merchants' clerks.

A Workmen's Compensation Act outruns in liberality the English law upon which it is based. But the most remarkable statute dealing with the relations of employers and workpeople is the Industrial Arbitration Law, passed in 1894, for the purpose of superseding strikes and lockouts by the arbitration of State tribunals empowered to give decisions legally binding. Under this elaborate enactment compulsory awards may be given or agreements voluntarily entered into and registered, dealing with all industries where wage-earners are organized in unions. The act is constantly invoked and is accepted by both capital and labor, though with occasional complaints. Its practical results have been so far the disappearance of labor conflicts, the stamping out of sweating, a general improvement of the conditions of labor, coupled with a tendency to refuse to grant a large and sudden increase of pay.

Side by side with the Labor Laws an Old Age Pensions Act, passed in 1898, provides for the poor of both sexes, after the age of 65, a pension not exceeding £26 a year. An applicant for a pension must be of good character, have lived 25 years in the Colony, and have an income of less than £60 a year. (Married couples must have less than £90.) The pension diminishes by one pound a year on each pound of private income above £34 a year possessed by an applicant; the act is cheaply administered, the cost being less than £4,000 a year. Nor does it seem to have yet diminished national thrift.

**Land and Land Taxing.**—The census of 1901 showed the number of farmers, graziers, and gardeners to be large:

Farmers . . . . .	33,267
Ranholders . . . . .	3,220
Gardeners and fruitgrowers . . . . .	3,657

The total number of freeholders of more than five acres of rural land increased from 30,764 in 1883 to 43,735 in 1902. The land held in freehold is now roundly 17,000,000 acres; that leased from the Crown about 15,000,000 acres; that leased from private persons and public corporations 3,500,000; from the native tribes 1,750,000. About 70 per cent of the occupied land is held in holdings of less than 200 acres.

One of the avowed objects of the Democratic and Progressive political party formed in 1877 was to restrict the growth and reduce the extent of large landed estates, and multiply small farms and holdings. This rather than Land Nationalization was, and is, their policy. Before the year mentioned, land monopoly, allowed to grow almost unchecked, had locked up great areas of fertile land in almost unpopulated pastoral properties. As late as 1898, considerably more than half the Crown lands which

had so far been alienated were shown to be held in this manner: 584 owners possessed 10,400,000 acres. The pastoral leases of the Crown were on a similar scale; for 12 leaseholders occupied 2,541,000 acres. A law advocated by Sir John McKenzie limited acquisitions of Crown land in freehold to one square mile of agricultural land. After 1891, the same statesman caused much of the public land to be leased at a quitrent for 999 years instead of being sold, reduced the average area of the pastoral leases, and in 1894 carried a law authorizing the State to compulsorily expropriate private owners at a price to be determined by arbitration. In 13 years the State has repurchased roundly 800,000 acres, for which somewhat less than four and a half million sterling has been paid. Of 137 properties, all but four were bought by friendly treaty. Over 11,000 souls are already settled on the repurchased land, as perpetual State tenants, and the rents collected from them in 1905 amounted to £164,000. The yearly profit to the Treasury is now about £33,000. The rents are punctually paid and the farmers are thriving.

The graduated land tax imposed in 1891 had for one of its objects the subdivision of the larger estates. In place of the tax hitherto levied—a property tax of one penny in the pound on the capital value,—landowners had thenceforth to pay the penny on the unimproved value only of their estates. All building, improvements, and live stock were exempted. Small holdings were exempted up to the value of £500. The tax, therefore, fell lightly on small or moderate-sized farms. On estates the unimproved value of which reached or exceeded £5,000, a special tax was levied, graduated so as to press with severity on the greater properties. This tax mounts by eight steps from one-sixteenth of a penny on £5,000, to a maximum of threepence in the pound on land holdings valued at £210,000. For land tax purposes, mortgages are deducted when assessments are made; a penny in the pound is levied on them but the money lender, not the landowner, pays it. The effect of the deductions and exemptions allowed under the land tax is to relieve nearly four-fifths of the 116,000 landowners of the colony from the impost altogether.

**Income and Other Taxes.**—All incomes over £300 a year, not derived from land, are subject to income tax. On incomes between £300 and £1,300 a year the tax is sixpence in the pound; above £1,300 sixpence on the first £1,000, and one shilling on the excess. Companies pay one shilling in the pound on all profits. Foreign companies pay only on profits made in New Zealand. The following table for the year ending March, 1909, shows how small a share of the total public revenue is drawn from direct taxes:

HEADS OF REVENUE.		Ending March, 1909.
Customs . . . . .		£2,801,248
Railways (gross) . . . . .		2,918,507
Stamps . . . . .		1,591,328
Land tax . . . . .		604,901
Income tax . . . . .		321,044
Beer duty . . . . .		116,214
Registration and other fees . . . . .		117,061
Marine . . . . .		43,865
Miscellaneous . . . . .		264,210
Territorial revenue . . . . .		222,857
		<hr/> £9,001,285

## NEW ZEALAND—INDUSTRIES AND FINANCE

In the 10 years from 1895-06 to 1904-5, the income tax collected increased by 174 per cent though the population grew by 23 per cent only—a striking indication of the relative growth of wealth.

**Public finance.**—Public finance, important in all countries, has had an especially direct influence on the history of New Zealand, where it has moulded and been affected by local circumstances and a policy of State-socialism. From the first the government of the Colony has been a borrower, and has gradually run up a debt, mainly external, and in 1906 reaching £62,192,000. It may be convenient to divide the financial story into four periods. In the first of these, the 30 years between 1840 and 1870, borrowing was mainly the result of exceptional necessities—pressing needs for funds to buy out the New Zealand Company, to buy lands for settlement from the aboriginal tribes, and to pay the cost of wars with these owners of the soil. A few public works, including one considerable railway, were begun locally and taken over by the central authority.

After thirty years the Colony with less than a quarter of a million whites owed £7,000,000. Then, incited by a bold and very able Jewish financier, Sir Julius Vogel, the colonists resolved to undertake the opening up of the islands on the lines of the development of a large unoccupied estate. Railways, telegraphs, roads, and bridges were to be pushed on; more land was to be bought from the natives; immigrants were to be imported in large batches. To this end the treasury was to borrow money in London.

Millions were borrowed and spent and, in the main, well spent. By 1881 the white population rose to 501,000. But in 1879 a financial crisis due to falling prices, bad banking, and a wild land speculation had smitten the Colony, and ended the second of the four periods. The resulting depression did not begin to pass away until 1895 and during the intervening years confidence in the policy of State borrowing and development weakened.

In 1895 the commercial cloud began to lift. Prices of raw products were rallying. The settlement of the waste lands was increasing production. The effects of refrigeration in stimulating the export of butter, cheese, and still more frozen meat was putting money into the farmers' pockets. The Progressive Party determined to borrow, not only to continue public works, but to break up monopoly by land resumption and to cheapen money by lending money on mortgage to the middling and smaller farmers. In August, 1895, then, a loan of £1,500,000 was raised in London. And during the 11 subsequent years borrowing has gone on at an accelerated pace. To-day, we have the spectacle of a heavily indebted government which nevertheless easily raises a large and growing revenue paid by a prosperous community without serious complaint or hardship, £3,750,000 sterling being raised in the year by taxes which amount to £1 13s. a head. Yet trade and production advance rapidly, the wealth of the people has grown to £305 sterling per head, and a fiscal policy which might seem oppressive to the mass of consumers is lightly borne by a democracy which might lightly abolish it.

The explanation is, perhaps, to be found in

the beneficial character of the purposes upon which the borrowed money has for many years been spent. It has not been wasted in wars or upon the up-keep of a court or any army. The party now in office is certainly spending freely but the following analysis shows that the aims of the outlay are defensible. Between March, 1891, and March, 1905, £21,081,650 have been borrowed and spent in the following manner:

Public works .....	£8,458,214
Repurchase of private land for settlement .....	4,361,566
Purchase of native lands .....	6,497,000
Loan on mortgage to farmers .....	3,200,000
Loan to local bodies .....	2,087,000
Sinking fund accretions .....	1,646,000
Bank of New Zealand preference shares ..	500,000
Lands improvement .....	500,000

In addition to the £21,000,000 analyzed above, nearly £5,000,000 from surplus revenue has, since 1891, been added to the loan moneys and expended on development.

**Banks and Savings Banks.**—The Government has a substantial interest in the Bank of New Zealand, the chief chartered joint-stock bank in the Colony. The Government holds £500,000 sterling invested in preference shares of the institution and has guaranteed its debenture stock. In return the Government appoints the auditor, two bank directors, and a president with a veto. The bank, which was in desperate straits when, in 1893, the Treasury intervened to rescue it, is now prospering, and its ordinary shares which, in 1894, could not be given away, are now quoted at the price of £9.10s.

The five banks of issue which transact the ordinary banking business of the Colony are all colonial: two are New Zealand companies, three are Australian. They hold coin and bullion to the amount of £4,000,000 and the extent and progress of their business is thus indicated:

Year.	Deposits.	Assets.	Liabilities.
1857.....	£348,316	£419,860	£432,404
1870.....	3,127,769	6,315,354	3,819,670
1880.....	8,538,935	14,220,775	9,550,177
1890.....	12,368,610	17,735,259	13,356,598
1900.....	15,570,610	17,314,535	16,964,582
1904.....	19,074,960	20,893,096	20,643,359
1905.....	20,545,601	21,770,525	22,144,166
1908.....	21,821,753	29,098,567	23,311,903

Most of the savings bank deposits are made in the public post-office savings bank, which has 510 offices and held £8,839,307 to credit of its depositors in 1904. Ten years previously the sum to their credit was £4,066,594. The five private savings banks hold on deposit about £1,000,000.

The Government money-lending on mortgage to farmers and others is managed by the Advance to Settlers Office. In 10 years loans amounting to £4,174,000 have been authorized by the lending board controlling the office, in sums averaging £312 each. Most of the money has been loaned on rural freehold. The rate of interest charged is five per cent *plus* one per cent sinking fund applied to pay off the principal. The debt is thus automatically extinguished by 73 half-yearly payments. The legal and other charges of the office are very low. Up to the present time the office has suffered no losses, and there are virtually no arrears of

## NEW ZEALAND—EDUCATION

interest owing to it, while it has already accumulated a reserve fund of £125,000.

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**3. New Zealand—Education.** The first generation of settlers labored persistently to set up local schools. It was not, however, until 1877 that a national scheme of education available for all children alike, white and Maori, was established by the General Assembly. On the whole the measure of success gained by the friends of education has been high. New Zealanders may point to a university, to many secondary schools, and to a really complete and efficient system of primary teaching. During the last decade a creditable advance has been made in manual and technical class-work. The training of teachers, too, receives fair attention. Industrial schools for criminal, destitute, and neglected children have been successful in preventing the growth of any “larrikin” class. The Government maintains a school for deaf-mutes, and an Institute for the Blind has been founded by private generosity. The bulk of the money for education is taken from the general taxes, though substantial rents are drawn from land reserves. The Parliamentary vote spent in the year 1904-5 was £592,000, an increase of £225,000 since 1890. In the University and in secondary schools fees are charged. In the primary schools instruction is free in the six standards of the regular course; special and higher subjects are charged for. The primary system is secular, and attendance at some school is compulsory between the ages of seven and 14. The school attended may, however, be a private one, or a child may receive tuition at home. How seldom this privilege is abused is shown by the figures dealing with illiteracy among the population.

The average attendance at the primary public schools in the year 1904 was 116,506, and the number on the school-rolls at the end of the year 136,282. The percentage of attendance throughout the year was the very creditable proportion of 85.38. During the same year no less than 7,020 Maori or half-caste children attended school, a high number when it is remembered that the whole colored population amounts to but 43,000. The private primary schools of which two-thirds belong to the Roman Catholic Church, instruct 16,000 pupils. In round numbers 157,000 New Zealand children get elementary schooling. This means in the Government schools a good deal more than the three R's. It includes history, geography, vocal music, drawing, and elementary science. Boys are drilled and girls taught needlework. Military instruction is given to 14,000 cadets. No religious teaching of any kind may be given within school hours, though the attachment of the great bulk of the people to Christianity is shown by the muster-roll of the Sunday schools. This reaches 107,100.

There are 1,785 elementary public schools occupying 3,718 teachers, classed as follows:

Adult men.....	1,272
Adult women.....	1,797
Pupil teachers (male).....	144
Pupil teachers (female).....	505
	3,718

The proportion of women teachers is much lower than in the United States. The average net salary of a male adult teacher is £175; of a woman teacher £96. About half the colored school-children go to special village schools provided for the Maori race. The others attend the ordinary public schools where they consort on equal terms with white children.

The Minister of Education is the head of a central department, entrusted with the general supervision, financing, and protection of the national system and the direct management of the Maori Schools, industrial schools, and the schools for deaf-mutes. The ordinary public elementary schools are administered by provincial boards of education elected by school committees of parents and guardians. Of these committees one is attached to each school. The boards and committees appoint teachers in conjunction; the boards select and pay their own school inspectors—a weak point in the system.

The industrial school children number 2,000. Of these only one-third live in the Government reformatory schools; about one-third are boarded out; about another third are handed over to the authorities of Roman Catholic schools carried on under government inspection. A peculiarity of the New Zealand industrial school system is that the State remains *in loco parentis* to all its pupils until they are 21 years of age.

Secondary schools are of two divisions—district high schools controlled by the boards of education, and endowed schools (sometimes clerical), managed by governors of their own, but inspected by the Department of Education. Altogether about 6,500 children get secondary education, and more than two-thirds of them receive it free. About £9,000 is voted for open public scholarships, tenable at these schools.

The University of New Zealand is an examining, not a teaching body. It is controlled by a Senate of 24 members. Five local colleges affiliated to it do teaching work, but students may obtain degrees without keeping terms at any of these. None of the colleges are residential. In 1905, 1751 undergraduates were keeping term, 1157 males and 594 females. About 200 non-matriculated students were attending college lectures. The number of degrees granted since the foundation of the University in 1870 was 1018 at the end of 1905. Degrees are granted to women and men indifferently. Hitherto most of the professors and lecturers in the affiliated colleges have been graduates of English or Scotch universities selected in London. Even now, should a New Zealander secure a post, it is sometimes on the strength of academical distinction won in the Mother Country. The degree examinations are still conducted by English scholars. The examination papers set by them are sent to the Colony,

## NEW ZEALAND—GOVERNMENT AND HISTORY

and the candidates' answers posted in due course to London. Until lately, the same feeling of ultra-respect for English scholarship and example has been noteworthy in the college methods, and the University has confined its degrees to the five broad departments of arts, science, medicine, law, and music. In 1904, however, further powers were by statute given it to confer the degrees of Bachelor, Master, and Doctor of (a) Veterinary Science, (b) Dental Surgery, (c) Engineering (Mechanical, Electrical, Civil, Mining, Metallurgical, Naval, Architecture), (d) Agriculture, (e) Public Health, (f) Commerce.

In response to local demands the central department will spend money in equipping and maintaining classes for manual and technical instruction, and will even go to the length of erecting special school buildings. In 1904 the number of classes thus recognized and helped was 2,599, with an average attendance of about 13,700, and they are established in 50 localities. Sometimes the education authorities control them, sometimes they are the outcome of voluntary association. The department spent in aid of them in 1904, the sum of £27,425. Several schools of mining (notably one at Otago University College) attract about 270 students in all. Canterbury College supports a School of Engineering attended by 200 students, and a college and farm for teaching agriculture containing 40 resident students.

**Bibliography.**—‘The New Zealand Official Year-Book,’ (annual); ‘Reports of the Minister of Education’ (parliament papers); ‘The Calendar of the University of New Zealand.’

WILLIAM PEMBER REEVES,  
*High Commissioner for New Zealand, in London.*

**4. New Zealand—Government and History.**  
—**Constitution.** The constitution bears a general likeness to that in force in the colonies of Cape Colony, Newfoundland and Natal. It is in the main founded on an Act of the British Parliament of the year 1852, but the form then drawn up has been more than once amended by the colonists with the assent of the Mother Country. The Governor from England (for by custom he is never a New Zealander), is appointed by the King in Council, and usually holds office for five years. He receives £7,500 a year, and plays the part of a constitutional sovereign acting upon the advice of an Executive responsible to the General Assembly. He may, however, dissolve Parliament or refuse to do so, though asked by his Executive. In practice, his master is the Secretary for the Colonies in the British Cabinet, who may recall him. All acts of the colonial legislature require the Governor's assent, which he may withhold pending a reference to his superiors in London. Acts relating to currency, foreign immigration, ocean-going trade, and constitutional amendments are so referred. Though the Governor is titular commander-in-chief in New Zealand, local defense is entirely controlled by the Executive.

The Colony's Parliament, the General Assembly, is bicameral, consisting of a Legislative Council and a House of Representatives. The members of the first-named, who are appointed by the Governor for terms of seven

years, are the Nominees of the Executive of the day. Two of them are Maori chiefs. Formerly the Legislative Council was supposed to present property and conservatism. Now, owing to the long reign of the Progressive Party, it is little more than a somewhat less energetic replica of the popular Chamber, whose will it seldom thwarts. Councillors receive £200 a year. Their number is not limited, but, by custom, stays at or near 46, and is, just now, lower.

The elective Chamber, the House of Representatives, consist of 76 whites, and four Maori members. All are returned by single-member constituencies for the term of three years. The elections of the white members are all held on the same day. All adults,—of both sexes—who have resided a year in the colony and three months in an electoral district, may register and vote for one candidate. Any duly qualified male elector may himself become a candidate. Members are paid £300 a year, subject to deduction for absence without leave while the House is sitting. Their procedure is based upon that of the House of Commons, but the length of speeches is restricted by a time-limit, though there is no “closure” of debates. The Maori members address the House in their own language, using an interpreter.

Eight salaried ministers comprise the Executive Council. They may hold office as long as they possess the confidence of the House of Representatives, and in practice all important legislation is initiated by them. Roughly speaking, the English two-party system has been copied and for many years a Progressive and a Conservative party have disputed the ground. Party machinery, however, is neither elaborate nor all-powerful. The funds that sustain it are small and electioneering is cheap and singularly free from corruption. The secrecy of the ballot is absolute. The expenses of men; successful candidates do not exceed £50 apiece. The proportion of voters to population is extraordinary as the following table—which deals with White electors only—shows:

Date of General Election.	Estimated total adult Persons	Number on Rolls.	Proportion of Adult Persons registered as Electors	Number of Persons who voted	Proportion of Persons on Rolls who voted
1893...	310,010	302,997	94.98	220,082	75.25*
1896...	356,058	339,230	95.11	258,254	76.13
1899...	386,140	373,744	96.79	279,330	77.59*
1902...	429,385	415,789	96.83	318,859	76.69
1908...	539,950	537,003	99.64	428,648	79.82

At the elections December 1905 the number on the rolls was 476,473, and the number voting 395,657.

Women obtained the franchise in 1893, and, as will be seen from the subjoined figures, make use of it almost as freely as men; though they are still ineligible as candidates. An experience of 13 years has shown, by general admission, that female suffrage has done no social or political harm whatever. On the whole, beyond listening to speeches and recording their votes, they take less open and active part in politics

\* Excluding figures for three electorates in which there was no contest.

† Including 4,974 informal votes.

## NEW ZEALAND — GOVERNMENT AND HISTORY

than was anticipated. They do comparatively little platform speaking. Certainly their vote has not changed the balance of parties. They have, however, strengthened the anti-liquor movement and have stimulated sympathetic reforms touching children and their own sex:

THE WORKING OF WOMEN'S FRANCHISE.

Date of General Election.	Estimated Total adult Females	Number of Women on Rolls.	Proportion of Adult Females registered as Electors	Number who voted	Proportion of Females on Rolls who voted
1893.....	139,471	109,461	78.48	90,290	85.18*
1896.....	159,656	142,305	89.13	108,783	76.44
1899.....	177,323	163,215	95.24	119,550	75.70*
1902.....	195,783	185,944	94.97	138,565	74.52
1905.....	.....	212,876	.....	174,615	.....
1908.....	243,504	242,930	99.76	190,114	78.26

**Local Government.**—Local Government is marked by a subdivision of functions resulting in a large number of directly or indirectly elected boards and councils.

In addition to the boards and committees of education, and to hospital and charitable aid boards dealing with sickness and indigence, the Colony contains the following numbers:

CHIEF LOCAL UNITS.

Boroughs .....	100
Town districts .....	34
Counties .....	94
Road districts .....	216
Harbor Boards .....	25
Drainage districts .....	22

The local franchise is not quite so simply and sweepingly democratic as the parliamentary. In the municipalities mere residence does indeed confer the right to vote, but not on any question relating to loans or rates. In rural districts plural voting is still in force. The revenue of the local bodies comes mainly from rates, license-fees, harbor-dues and rents from land-reserves. The boroughs receive annually about £500,000 from rates and fees. Boroughs and harbor-boards have been considerable borrowers both outside and inside the colony, and the total debts of local bodies reach £9,000,000 sterling. Only one of their number, however, is in financial difficulties. The larger municipalities are beginning to bestir themselves in providing locomotion, lighting, water and other improvements. Generally localities have shown themselves less enterprising than the central government in social and industrial experiments.

**History.**—The islands were discovered by a Dutch sea-captain, from Batavia, Abel Jansen Tasman, who chanced upon them in 1642, but did not land. Captain Cook was the next recorded comer. He visited the group in 1769 and thrice subsequently, sailing round both islands, mapping them out and describing the shores and the natives. Thereafter came French navigators, American whalers, South Sea traders, beachcomers, runaway convicts from Australia, and, at last, in 1814, missionaries from New South Wales headed by Samuel Marsden. But, although Australia lay under the British flag, the English Government re-

fused or hesitated for 70 years to annex New Zealand. Partly this was due to ignorance of its value, partly to disinclination to interfere with its warlike and intelligent natives whose numbers had been greatly over-estimated by Cook, and whose ferocity and cannibalism made them a name of fear wherever the tales of South Pacific mariners were repeated.

The Maori of New Zealand are a branch of the Polynesian race found in Hawaii, Samoa, and other Pacific groups eastward of Fiji. They are well-built, brown-skinned, pleasant-looking, courteous in bearing and speech. They probably reached New Zealand in the 14th century, sailing in double-canoes. When discovered by Europeans they were divided into a number of small tribes, often at war, and as late as 1770 were neolithic men, using weapons and tools of polished stone and knowing neither pottery nor metal-working. Their artistic qualities found expression in wood-carving, weaving, and dyeing. They did not even employ bows-and-arrows, and in war fought chiefly hand-to-hand with spears and clubs. On the other hand their stockade-building was skillful and their larger huts evinced some advance toward architecture. They were expert gardeners and, in the absence of quadrupeds, clung to the sea-coast, the river-sides, and to lakes and forests where they could find fish and birds in abundance. Their tribal system was based on modified communism. Chiefs and priests controlled them, sustained by the terrors of tapu. Their mythology, many of their legends, and some of their folklore show much poetry and imaginative power. Why they never became numerous is not very clear. Probably their tribal wars, infanticide, and sexual immorality helped to keep them down. Probably also their tropical origin unfitted them to cope with the cold winds and frosts of a temperate climate.

Almost coincidentally with the coming of the missionaries, the Maori began to obtain muskets and gunpowder for use in inter-tribal struggles, with the result that about one-fourth of them were exterminated in 20 years. Then the fighting died down, and between 1830 and 1840 large numbers were converted to Christianity. Unfortunately white land-grabbers began bargaining for tracts of country, making preposterous claims. Finally two colonizing companies, French and English respectively, resolved to plant settlers in the islands. The English company organized by Gibbon Wakefield was the first in the field, its emigrants reaching Wellington in January 1840. Their departure from England forced the hand of the British authorities who despatched a man-of-war, under Captain Hobson, to annex the country. Hobson hoisted the Union Jack on 22 Jan. 1840, and, at Waitangi, concluded a treaty with the natives by which their lands were guaranteed them and they accepted British rule. He chose Auckland as his seat of government. Meanwhile Gibbon Wakefield's company planted settlers at Wellington, Nelson, Wanganui, and New Plymouth in the region adjacent to Cook's Straits, only to find their land-purchases disallowed by the British officials. Ruin overtook them; disputes broke out with the natives, and in the far north at the Bay of Islands the English officials blundered into a war which

\* Excluding figures for three electorates in which there was no contest.

† Including informal.



## NEW ZEALAND—GOVERNMENT AND HISTORY

proved the fine fighting qualities of the Maori. A strong governor, Sir George Grey, restored order, conciliated the Maori, bought land and enabled settlement to make headway. Gibbon Wakefield, undaunted by his first difficulties, founded the settlements of Otago (1846) and Canterbury (1850) in the southeast where there was no native opposition. In 1853 England gave the colonists self-government and in 1856 the first executive responsible to the local Parliament took the reins.

For the next 20 years the working of the Constitution was complicated by the existence of local provincial councils with large powers in each of the scattered settlements. Their jealousies and conflicts with the central authority were only brought to an end by their abolition in November 1876. They represented a peculiarity in the organism of the Colony which is even now noticeable. Settled from many points, the country has, even now, no one preponderating city. The jealousies and rivalries of a score of districts still worry governments and amuse travellers from other lands.

Within five years of the grant of responsible executives the colonists found themselves at war with the natives—first with one league of tribes, then with another. English troops, to the number of 10,000 were brought in; but the Maori were not always worsted: the fighting dragged on intermittently for 11 years, to be finally ended by the colonial militia and friendly natives, after the British red-coats had been withdrawn. The colonists found themselves left with a war debt of more than £2,500,000 sterling, while from 1860 to 1871 the North Island made little progress. Taught by this hard lesson, they allowed an able minister, Sir Donald McLean, to pursue a conciliatory policy. Parliamentary representation was given to the Maori, and schools to their children; their land titles were scrupulously respected; while roads were pushed through the interior and rifles kept out of it. Serious disturbances were gradually made impossible.

Meanwhile the South Island was making rapid progress. Early in the fifties enterprising Australian sheep-owners discovered that the eastern moiety made excellent grazing country, and it was soon parcelled out into "runs" or ranches. Then, in 1861, alluvial gold in abundance was found at Tuapeka, in Otago, and soon afterward in Westland. Diggers rushed in by tens of thousands. Agriculture began to spread, and by 1875,—aided by the introduction of the reaper and binder and other farm machines and tools from the United States,—it showed a promise of expansion which has hardly yet been redeemed. After 1872 the North Island began to move forward, encouraged by peace and the making of railways, roads, and bridges. The burning off of the fern and clearing of the forest began to make way for sheep and cattle.

Up to 1877 public affairs were controlled by the employing, landowning, and professional classes and by a few large financial institutions. The franchise was limited. Even the smaller farmers were overshadowed if not overawed. The native wars, the provincial divisions, the all-absorbing work of pioneering delayed the formation of any definite party of democracy. The expenditure of millions of bor-

rowed money on public works also absorbed attention after 1871. In 1877, however, the inevitable development came about, hastened by the appearance of a leader of eloquence and prestige in Sir George Grey, formerly governor. Supported by two lieutenants of greater practical parliamentary talent than himself, Robert Stout and John Ballance, Grey succeeded in forcing on manhood suffrage and triennial parliaments, while his party recast the public education, making it national, free, secular, and compulsory.

Industrial depression which overtook the colony during Grey's premiership in 1879 discredited progressive politics for a while. The farmers, dreading a land-tax, rallied round the more conservative leadership of Sir John Hall and Sir Harry Atkinson. For the next 11 years the story of New Zealand is largely a tale of efforts to find industries more profitable than the growing of wool and wheat—efforts which had their outcome first in frozen meat factories, later on in co-operative dairies. Coal mines were opened with success and two valuable natural monopolies—hemp, (*phormium tenax*), and kauri gum—were exploited. The Parliament cut down public expenditure and reduced borrowing for some years. Labor, now armed with voting power, felt the pinch of depression. Wages fell, the unemployed clamored, tramps abounded. Trade unions began to organize, and socialistic writings to be studied. The small farmers and their sons cried out upon land monopoly and high rates of interest. In 1890 a labor conflict, the Maritime Strike, showed the trade unions,—who were badly beaten therein,—the desirability of making Parliament their battle-ground and of allying themselves with Ballance and the Democrats. At the elections of December 1890 the allied forces swept the polls, and the Liberal or Progressive party, then returned to power, has continued to govern the Colony without a break.

The 15 subsequent years have been marked by a series of bold political and social experiments. These have been latterly so far justified that since 1895 the Colony has regained and enjoyed a remarkable degree of prosperity, while to a large extent its inhabitants seem reconciled to most of the novel enactments. Ballance died in 1893, but his successor, Richard Seddon, a man of robust temper, extraordinary energy, and great natural shrewdness, gained a popularity and influence which seemed quite undiminished at the time of his sudden death in June 1906.

During the Boer War in South Africa public attention was to some extent diverted from local politics, for New Zealanders hotly espoused the mother country's cause and despatched 6,000 mounted riflemen, volunteers, to fight therein. But otherwise colonists have divided their attention not unequally between politics and prosperity. No leader of striking power has come forward to challenge the Progressives, whose majority in Parliament had risen to about three to one at the moment of Seddon's death. The dominant party, however, has experienced a sensible internal change. Labor has less influence, and the farmers more, than was thought to be the case between 1890 and 1896.

## NEW ZEALAND FLAX—NEWARK

Few New Zealand men have made any name for themselves outside the narrow limits of their own shores. Gibbon Wakefield, the founder of the Colony, played a conspicuous part in shaping England's colonial policy between 1830 and 1856. He finally settled in New Zealand and was a member of the first House of Representatives, but owing to failing health never distinguished himself in the young community. Sir George Grey (1812-1898) spent nearly 40 years in New Zealand and left a lasting mark on its institutions. A man of literary tastes, he compiled a valuable collection of Maori legends. His services in South Australia and South Africa and the curious contrasts of his career in New Zealand—where he played in turn the parts of absolute ruler and leader of the people—made this eloquent, brave, and refined figure the most interesting in the story of New Zealand. In marked contrast to him stands out the more boisterous but strong, bold, and successful personality of Richard Seddon (q.v.) (1844-1906), a Lancashire mechanic, who entered New Zealand politics in 1879, became Minister of Public Works in 1891, and grasped the Premiership in 1893. Seddon will be remembered in New Zealand, not only for the notable experimental legislation passed during his long term of office and the general prosperity enjoyed, but as the personification of restless energy, bluff, popular geniality, and a devotion to political business, control and management, which undoubtedly wore him out and killed him.

Amongst other New Zealand public men the names of Atkinson, Fox, McKenzie, McLean, Ballance, and Stout are the most prominent. Fox, who was more than once Premier, wrote a good history of the fighting with the native tribes in the years 1826-66. Alfred Domett, another Premier, was the literary friend called "Waring" by Robert Browning, and himself wrote a narrative poem 'Ranolf and Amohia,' of no mean merit. The best book in prose yet written by a New Zealander is, beyond question, the 'Old New Zealand' of F. E. Manning, a delightful and accurate study of life among the Maori tribes before annexation.

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**New Zealand Flax.** See FIBRE.

**Newark,** nu'ark. Del., town, in Newcastle County; on the Philadelphia, B. & W., and the Baltimore & O. R. R.'s; about 11 miles south of Wilmington. It is in a section of the State noted for its productiveness. The chief manufactures are paper, machinery, fibre, and canned goods.

There is considerable trade in the manufactured articles, fruit, and vegetables. It is the seat of the State College, opened in 1833. The town owns and operates the electric-light plant and the waterworks. Pop. (1890) 1,191; (1900) 1,213; (1910 est.) 1,300.

**Newark,** N. J., city, county-seat of Essex County, metropolis of the State; in latitude 40° 41' N., longitude 74° 10' W.; on the Passaic River. The city proper is three miles above Newark Bay, eight miles by rail from New York city, and is one of the several cities within the direct zone of the influence of the nation's metropolis. Newark ranks eleventh in manufacturing and fourteenth in population in the United States. The area is 22 square miles of which six square miles are salt meadows. The water frontage on Newark Bay and the Passaic River is 10½ miles; the width of the channel is 200 feet; depth at low tide 12 feet.

**Manufacturing.**—The city has the distinction of ranking first in the Union in the value of its manufactures and the diversity of its industries, according to its per capita population. In 1909 (Government Census) the city had 1,858 manufacturing establishments, with an invested capital of \$154,233,000; the number of mechanics, members of firms, and clerks, 68,282; the amount paid annually to salaried officials, clerks, and mechanics, \$44,853,000. The annual cost of material used was \$114,679,000, and the value of the annual products was \$202,512,000. The chief industry of Newark is that of leather, over 50 firms with \$5,500,000 capital, producing \$12,000,000 annually. Brewing ranks second, with 20 firms, employing \$6,000,000 capital, and about \$9,000,000 product; jewelry third, with 112 establishments, capital \$4,500,000, product \$6,000,000; machinery fourth, 75 establishments, capital \$4,000,000, product \$4,500,000. Other industries employing upwards of a million capital and producing goods to the value of from one to three million dollars annually are: Boots and shoes, clothing, hats, hardware, trunks and valises, watch cases, corsets, smelting and refining, harness, varnishes and celluloid. The manufacture of celluloid is distinctively a Newark industry; it was invented by Newarkers, and the manufacture of it is peculiar to this city. The Clark Thread Works, Balbach's Smelting and Refining Company, the Crescent Watch Case Company, and several similar industries that are located in this city would of themselves give a standard of importance similar to such places as Lowell, Waltham, and Elgin.

**Transportation and Commerce.**—The principal railroads entering the city are the Pennsylvania, the Lackawanna, the Lehigh Valley, the Erie, and the Central of New Jersey. The large number of local trains which connect with the New York ferries and the cities on the Hudson give Newark the advantage of the ocean steamer traffic. The Passaic River entering the Newark Bay furnishes the city a most important direct water route to the ocean. Electric lines extend to all the nearby cities and villages. The reports of 1901 show that for that year the steam railroads had carried 10,000,000 passengers to and from Newark; the number of cars loaded with freight was 174,589 (tonnage, 3,671,780). The tonnage of the river freight was 1,447,823.

## NEWARK

### *Buildings and Municipal Improvements.*—

There are 40,000 buildings in the city. The principal public buildings are the government building, the county court-house (cost \$1,750,000), the city hall (\$1,500,000), the free public library (\$350,000), the Prudential (\$3,000,000), the Mutual Benefit (\$2,000,000), and the churches and the schools. Several of the banks, insurance companies and business corporations have fine buildings. There are 225 miles of broad streets, 115 miles of which are paved. There are 155 miles of sewers, 87 miles of which are drain-tile and 68 of brick. The streets are lighted by a private corporation. The water plant, owned by the city, furnishes, by gravity, a supply of 50,000,000 gallons per day. There are 275 miles of mains. The original cost of the water plant was \$10,000,000. There are 16 public parks, chief of which are Military (the old training ground), East Side, West Side, Branch Brook, Weequahic, Lincoln, and Washington.

*Charitable Institutions.*—There are nine hospitals, the largest of which are the City Hospital, the Essex County Hospital for the Insane, Saint Michael's, Saint James', Saint Barnabas', and the German hospitals. There are 14 homes and four orphanages. The House of the Good Shepherd is a home and a reformatory. The Little Sisters of the Poor have a home for the aged over 60 years of age.

*Churches and Societies.*—There are 170 churches, representing a large number of denominations, 174 lodges, 185 societies, 163 associations, and 92 clubs.

*Educational.*—There are 46 public schools, 786 teachers, and 38,125 pupils. The value of the public school property is \$2,632,000. There are 21 Roman Catholic parish schools, with 204 teachers and 9,820 pupils. There are 40 private schools, including colleges, academies, business colleges, kindergartens, and elementary schools. The free public library contains 77,297 volumes, which cost \$90,000. Other libraries are the Prudential Insurance Company's Law Library and the Library of the Lawyers' Club. The New Jersey Historical Society has a collection of great historical value. The great civic body of Newark is its Board of Trade, with a membership of 1,000 business men.

*Banks and Finances.*—There are 16 banks; seven national, four trust companies, and five savings banks. The total deposits aggregate \$50,000,000, and the total assets \$85,000,000. There are 77 building and loan associations, the assets of which are \$10,805,000. There are four fire insurance companies, assets of which are \$8,640,000; two life insurance companies, assets of which are \$127,000,000. The taxable valuation is \$163,303,000; the tax rate, 2.1 on a two thirds basis. The annual revenue is over \$10,000,000. The chief items of expenses for maintenance and operation are: Schools, \$900,000; public library, \$40,000; police department, \$425,000; fire department, \$300,000; public health, \$75,000; public markets, \$20,000; city hospitals, \$65,000; city homes, \$86,000; outside poor, \$40,000; streets and highways, \$275,000; public scavenger work, \$75,000; lighting, \$215,000; sewers and drains, \$61,000.

*Vital Statistics.*—The number of families is 54,645, and the number of dwellings 30,397. The number of dwellings occupied by owners, 21.1 per cent of the total. The number of births

per year, 61,117, rate per thousand, 24.85 per cent. The number of deaths per year, 4,923, rate per thousand, 18.50 per cent.

*History.*—Immediately following the English conquest of the New Netherlands, in 1664, a part of the Dutch possessions in North America, being practically what is now the State of New Jersey, was granted to Lord John Berkeley and Sir George Carteret. The settlement of northeastern New Jersey was immediately begun under a liberal form of government, a site near the mouth of the Passaic River proving attractive to certain Congregationalists, then settled in the colony of Connecticut. In May, 1666, the New Englanders removed "their families, their beloved pastor, their church records, and communion service, their deacons, and their household goods" to the site of the future city of Newark. By 1685, Newark, in which the Congregationalists had settled, was a compact town of 500 inhabitants. The system of local government was like that of many early New England villages, being the limitation of political and religious activity, through the agency of the town meeting, to those who professed Congregationalism.

The strong element of conservatism, characteristic of the settlement of Newark, remained unchanged until long after the opening of the 19th century. Religion and education were warmly supported, and for several years the College of New Jersey, now Princeton University, was located at Newark. The tidal waters of the Passaic River gave easy access to New York, the country-side supplying provisions and wood to the inhabitants of Manhattan Island. Newark was also engaged in a coastwise trade. To a degree the young community was somewhat isolated owing to the difficulty of road-building over the marshes and the ridge of rocks separating Newark from Paulus Hook, now Jersey City.

In the Revolutionary struggle Newark took an active part. As early as June 1774, her inhabitants protested against the Port Bill, and offered to become parties to a plan of union to redress grievances. In November of the same year inhabitants of Newark, as members of the Essex County grand jury patriotically answered the charge of the loyalist chief justice, while in January 1775, the royal newspapers were boycotted by many of the inhabitants of the town. In the spring of that year some of the inhabitants declared that they were willing to risk their lives and fortunes for American liberty. The "gentlemen traders of this town" were recommended not to supply provisions to Canada and other loyal portions of North America. In March 1776, the Newark committee regulated the price of West India products, and traders were notified that defiance of regulation would cause the storekeeper to be declared an enemy to his country.

Newark was early identified with the efforts made to secure internal improvements, even before the second war with England. Turnpikes were extended in every direction, bringing the town in close communication with the northwestern portion of the State, from which section Newark has largely drawn men who have become locally prominent. During the early years of the 19th century the first bank organized in New Jersey (1804) was established in Newark, while one of the chain of banks having the word "state" in their titles (1812) was located in this city. In 1824 the city was declared by legisla-

## NEWARK—NEWBERN

tive enactment to be the terminal of the Morris and Essex Canal, which was soon constructed, and united the waters of New York Bay with those of the upper Delaware. During the early 30's the New Jersey Railroad was built between Jersey City and New Brunswick, which with Camden and Amboy connections placed Newark on the direct route between New York and Philadelphia. Following the construction of these lines, now a part of the Pennsylvania Railroad system, came railroads now forming parts of the Lackawanna and the Central Railroad of New Jersey systems.

Pop. (1810) 8,008; (1830) 10,953; (1850) 38,804; (1860) 71,941; (1870) 105,050; (1880) 136,508; (1890) 181,830; (1900) 246,070; (1910) 347,460. Consult: City records; Atkinson, 'The History of Newark, N. J.'; 'Records of the Town of Newark, 1666-1836.'

JAMES M. REILLY,  
*Secretary Newark Board of Trade.*

**Newark, N. Y.**, village, in Wayne County; on the Erie Canal, and on the West S., the Northern C., and the New York C. & H. R.R.'s; about 176 miles west by north of Albany, and 30 miles east by south of Rochester. It was settled in 1820 by people from Rensselaer County in the eastern part of the State. It was incorporated as a village in 1825. It is in a fertile agricultural region, but the village has considerable manufacturing interests. In the tinware works there are 150 employees; in the paper box factories, 150; the glass factory, 50; the canning and preserving factory, 200; and in other establishments fully 200 more employees. Newark has a large trade in farm and dairy products, fruit, and its manufactured articles. Its educational institutions are the Union Free School and Academy, the public elementary schools, and the free public library. There are 10 churches, and a number of church and literary charitable and educational societies. The State Custodial Asylum for Feeble-Minded Women is located here. The three banks have a combined capital of \$175,000. The government, according to the "Village Law of the State," is vested in a president and trustees,—eight trustees—two of whom are elected each year. The population consists of nearly all native born Americans, over one half of whom are of Dutch, German, and Irish descent. Pop. (1890) 3,698; (1900) 4,578; (1910) 6,227.

**Newark, Ohio**, city, county-seat of Licking County; at the junction of three branches of the Licking River and on the Ohio Canal, and the Baltimore & O., and the Pennsylvania R.R.'s; about 30 miles east by north of Columbus, and within 14 miles of the centre of the State. It was settled in 1802 by a colony from the eastern part of the United States. Nearby are two large mounds which belong to the works of the "Mound Builders." It is in an agricultural region, and in the vicinity are valuable deposits of sandstone, extensive coal-fields, and natural gas. The chief manufactures are glassware, chemical instruments, carriages, hardware, bottles, electric cars, locomotives, machine-shop products, rope, foundry products flour and lumber products. There are (1903) 21 manufacturing establishments in which there are 7,460 employees. The streets are well paved and well kept. The State Encampment Ground, and the Auditorium, a fine theatre erected as a memorial to dead sol-

diers of the Civil War, are of much interest. There are 15 churches, a high school, public and parish elementary schools, and a public library, established in 1877. The six banks have a combined capital of \$900,000; and the annual amount of business transacted is \$3,000,000. The government is administered under the charters in accordance with the Ohio State Municipal Code. The inhabitants are nearly all American born. Pop. (1910) 25,404.

**Newark Series**, in geology, a term applied to that part of the Triassic system (q.v.) in eastern North America. Its limits are Nova Scotia on the north and South Carolina at the south. The typical deposits are near Newark, N. Y., whence the name is taken. The deposits in the series are conglomerates; breccias; thick red sandstones, which must have originated in crystalline waste, as is evident from the comparatively large amount of mica and the feldspaths; and basalt, which accompanies the sedimentary rocks and occurs in dikes and sheets, such that the violent volcanic character of their derivation is made certain. Some few fossils occur in the series, scarcely any of marine types, plants and foot-prints preponderating. The commercial value of the deposits of the Newark series is in the brown sandstone building stone of New Jersey and Connecticut, and the coal veins of North Carolina and Virginia.

**Newbern, nū'bern** (formerly **NEW BERNE**), N. C., city, county-seat of Craven County, port of entry of the Pamlico district; at the confluence of the Neuse and Trent rivers, and on the Atlantic C. L., the Atlantic & N. C., and the Pamlico, O. & W. R.R.'s; about 100 miles in direct line southeast of Raleigh. It has regular steamer connection with New York and other Atlantic ports. It was settled in 1710 by a company of Swiss and Germans under Baron De Graffenreid. The place was named "New Berne" after Berne in Switzerland. It was incorporated as a city in 1723. It soon became an important southern seaport, on account of its harbor. It was the capital of the Province of North Carolina for several years. It was one of the strongly fortified ports of the Confederacy. (See **NEWBERN, OPERATIONS AT, IN THE CIVIL WAR.**) The chief industrial establishments are lumber and planing mills, grist mills, shingle factories, fertilizing works, ice factory, knitting mill, pickle works, turpentine distillery, shipyard, carriage factory, lime kiln, canning factory, and the Atlantic & North Carolina railroad-shops, in all having 2,500 employees. There is an extensive trade in lumber, cotton, turpentine, vegetables, and fish. The prominent buildings are, a government building (court-house, custom-house, and postoffice), the county court-house, jail, County Home, and the opera house. The educational institutions are the public schools, separate for white and colored. There are 10 church edifices and others in contemplation. The three banks have a combined capital of \$152,000. The government is vested in a mayor, board of aldermen, and a council of 12 members. The electric-light plant and the water-works are owned and operated by the city. About 95 per cent of the inhabitants are native born Americans. Pop. (1890) 7,843; (1900) 9,090; (1910) 9,961.

C. L. STEVENS,  
*Editor 'New Berne Journal.'*

## NEWBERN

**Newbern, Operations at,** in the Civil War. Roanoke Island (q.v.), N. C., was captured by Gen. Burnside 8 Feb. 1862, and on 6 March he embarked his troops for an expedition against Newbern, a point of much military importance, at the confluence of the Neuse and Trent rivers, near the head of an extensive and navigable arm of the sea, and connected by railroad with Beaufort Harbor at Moorehead City. By night of the 11th the entire naval and land command was off the mouth of Slocum's Creek, south of the Neuse, and about 15 miles below Newbern. The approaches to the city had been obstructed by sunken vessels and a double row of piles in the river. Four miles below the city, on the southern side of the river, and opposite the obstruction in the stream, was Fort Thompson, mounting 13 heavy guns. From the fort inland was a line of rifle-pits and redoubts extending about two miles to and beyond the Atlantic and North Carolina Railroad, and terminating on almost impassable ground. In the fort and on this line were 41 heavy guns and 19 field-pieces. The position was held by seven North Carolina regiments, a battalion of militia, and three batteries of artillery, numbering in all some 5,000 men, under command of Gen. L. O'B. Branch. Burnside's troops, 13 regiments of infantry, about 9,000 men, and 8 guns, were landed by noon of the 13th, and after a hard march in rain and deep mud bivouacked near the Confederate position, the naval vessels, under Commodore Rowan, moving up the river abreast of the infantry, and shelling the road and woods in advance. On the morning of the 14th the attack was made. Gen. J. G. Foster, with the 10th Connecticut and the 23d, 24th, and 28th Massachusetts, moved up a country road on the right; Gen. J. L. Reno on the left, with the 21st Massachusetts, 9th New Jersey, 51st New York, and 51st Pennsylvania, moved along the line of the railroad; while Gen. J. G. Parke, with the 4th and 5th Rhode Island and 11th Connecticut, moved in the centre, on a country road, as a reserve. Foster began the battle about 8 A.M. by an attack on Fort Thompson and the line near it, maintained the brunt of the contest for some time, and was reinforced by Parke. Meanwhile Reno had gained ground on the left, the entire division now became engaged, and the Confederates, after a resistance of four hours, broke and retreated to Newbern, burning behind them the railroad and turnpike bridges over Trent River. Burnside followed, crossed the Trent in boats, Branch retreating, and in the afternoon the Union troops occupied the city, capturing many heavy guns and other material. The Union loss was 90 killed, and 380 wounded. The Confederate loss was 64 killed, 101 wounded, and 413 captured or missing.

### *Confederate Efforts to Recapture Newbern.*

—The fall of Newbern was a serious blow to the Confederates, but the necessities of the army in Virginia forbade attempt to regain it until after the close of the campaigns of 1862, when troops were sent to North Carolina, and 13 March 1863, Gen. D. H. Hill, who had been assigned to the command in the State, organized an expedition for its recapture. Gen. Daniel's brigade moved from Kinston toward Newbern by the lower Trent road; Gen. Robertson's cav-

alry brigade was sent by the upper Trent road; and Gen. Pettigrew, with five North Carolina regiments and 15 guns, was ordered to approach the city near Barrington's Ferry, north of the Neuse, to attack two small gunboats in the river, and capture Fort Anderson, an earthwork on the river, opposite the city, garrisoned by 300 men of the 92d New York. At Deep Gully, a few miles out of Newbern, Daniel attacked five companies of the 25th Massachusetts, supported by two guns, and drove them in, but advanced no farther, as Pettigrew had failed. That officer, at daylight of the 14th, appeared in front of Fort Anderson and demanded its surrender, which was refused, and Pettigrew opened fire from all his guns, and engaged the gunboats Hetzel and Hunchback, which had been towed into position. The fire of the gunboats, with that of five guns of a battery of rifled guns from the other side of the Neuse, caused Pettigrew to withdraw and cover the movement of the 85th New York to reinforce the 92d. The casualties on either side were insignificant.

On 20 January 1864, Gen. Lee ordered Gen. Pickett, then at Petersburg, Va., to capture Newbern if upon examination he found it practicable, and authorized him to use four brigades of his command for the purpose, in addition to which he promised to assist him with Hoke's brigade of the Army of Northern Virginia. He gave detailed instructions for the movement, and all the Confederate forces in eastern North Carolina were to co-operate and retake Newbern, Plymouth, Washington, and other coast towns. On the morning of 30 January the movement began from Kinston in three columns; Gen. Barton, with his own brigade, Kemper's, part of Ransom's, 14 guns, and 600 cavalry, was directed to cross the Trent, take the works in front of Newbern in reverse, and cut off communication with the place. Col. Dearing was sent north of the Neuse with a cavalry force, two infantry regiments, and three guns, to attack Fort Anderson. Col. J. T. Wood, with picked crews in boats, was to descend the Neuse, seize the Union gunboats, and co-operate with Dearing in the attack on Fort Anderson. Gen. Pickett, with Hoke's brigade, three regiments of Corse's, two of Clingman's, and 10 guns, was to advance by the Dover road. Newbern had been strongly fortified, and was held by 2,000 men, under Gen. I. N. Palmer, and three gunboats were stationed in the Neuse and Trent rivers. An outpost of 300 men of the 132d New York was at Bachelor's Creek, eight miles above Newbern. Gen. Hoke, advancing by the Dover road, on 1 February, at Bachelor's Creek encountered the Union outpost, which was driven in after a severe Federal loss, and Pickett with his column crossed the creek and advanced toward Newbern. The batteries opened upon him; he made no attack, but awaited the result of the co-operating movements. Col. Wood, with 10 rowboats, carrying picked crews of 15 men each, armed with rifles and cutlasses, left Kinston at noon of 31 January, dropped down the river, and at 4 A.M. of 1 February arrived near the town; but, owing to a fog, he could not locate the position of the gunboats. He finally located the Underwriter, moored close in shore, near the wharf, and not more than 100 yards from three



## NEWBERRY — NEWBURGH

batteries; and at night he boarded her, killing her commander and some of the crew, and capturing a third of the remainder in a hand-to-hand conflict. The fires under the boilers of the vessel were very low, and in attempting to tow her out Wood was subjected to fire of artillery and infantry from the forts on shore, and therefore he set her on fire. Pickett waited for Barton's movement, which failed, and after a feeble demonstration he gave up the enterprise and withdrew to Kinston, after a loss of 45 killed and wounded. The Union loss was 326 killed, wounded, and missing.

The third attempt on Newbern was made by Gen. Hoke, who, after his capture of Plymouth, N. C. (q.v.), 20 April 1864, moved against the place and demanded its surrender, and on being refused began a siege. Hoke was recalled to Kinston, 5 May, and ordered to Petersburg, Va. Consult: 'Official Records,' Vol. IX., XVIII., XXXIII., XXXVI., and The Century Company's 'Battles and Leaders of the Civil War,' Vol. I.

E. A. CARMAN.

**Newberry**, nū'bēr-ī, **John Strong**, American geologist: b. Windsor, Conn., 22 Dec. 1822; d. New Haven 7 Dec. 1892. His early life was passed chiefly in the Western Reserve, Ohio, and he was graduated at the Western Reserve College in 1846 and at the Cleveland Medical School in 1848. From 1851 to 1855 he practised medicine in Cleveland. He was assistant surgeon and geologist to the government expedition that explored the country between San Francisco and the Columbia River; also accompanied Lieut. Ives in his exploration of the Colorado River, and the expedition under Captain Macomb in its exploration from the Santa Fé to the junction of the Grand and Green rivers. His reports upon the scientific results of these expeditions brought him great credit in the scientific world. At the beginning of the Civil War he became attached to the Sanitary Commission, and later secretary of its Western department. He was afterward connected with the Smithsonian Institution, and with the Columbian University, Washington, and in 1866 was appointed professor of geology and palæontology at the Columbia College School of Mines, which post he retained till his death. Besides many special reports and parts of general reports, his writings include: 'The Rock Oils of Ohio' (1859); 'Catalogue of the Plants of Ohio' (1860); 'Iron Resources of the United States' (1874); 'The Structure and Relations of Dinichthys' (1875); 'Palæozoic Fishes of North America' (1889); 'Later Extinct Floras' (1898); etc. He was especially conversant with the palæontology of the Carboniferous Era in America, and particularly with extinct fishes; and as a teacher he had great popularity and influence. He was among the early members of the National Academy of Sciences.

**Newberry**, S. C., town, county-seat of Newberry County; on the Atlantic Coast Line and the Southern R.R.'s; about 40 miles northwest of Columbia. It is in a region in which the cultivation of cotton is one of the chief industries. It has manufacturing establishments for cottonseed-oil, cotton goods, preparing cotton for shipment, coffins, fertilizers, and lumber products. It has considerable trade, chiefly in cotton products, fruit, and vegetables.

It has a fine court-house and city-hall, and is the seat of Newberry College, a coeducational institution founded in 1858 under the auspices of the Lutheran Church. The city owns and operates the electric-light plant and the waterworks. Pop. (1910) 5,028.

**Newbery**, nū'bēr-ī, **John**, English publisher and bookseller: b. Waltham Saint Lawrence, Berkshire, 1713; d. London 22 Dec. 1767. Going to London he began, in 1745, in Saint Paul's Churchyard, the publishing and selling of books. He also published 'The Universal Chronicle and Weekly Gazette,' in which Johnson's 'Idlers' appeared, and 'The Public Ledger,' in which Goldsmith's 'Citizen of the World' was printed. Newbery made a specialty of books for children, and published the 'Juvenile Library,' a choice collection of volumes, among which were 'Goody Two Shoes,' 'Tommy Trip and His Dog Growler,' and other surviving favorites. His intimate association with famous authors, the merits of his own work, and the reputation which he left for a spirit and life of benevolence combine to perpetuate an interest in Newbery's memory.

**Newbolt**, Henry John, English author: b. Bilston, Staffordshire, 6 June 1862. He was educated at Clifton and Oxford and was called to the bar of Lincoln's Inn in 1887. After practising his profession till 1899 he established the next year the London 'Monthly Review,' which he has since edited. He has published 'Taken from the Enemy,' a novel (1892); 'Mordred,' a tragedy (1895); 'Admirals All' (1897), verse; 'The Island Race' (1897); 'Stories from Froissart' (1899); 'Froissart in Britain' (1900); 'The Sailing of the Long-Ships' (1902).

**Newbolt**, William Charles Edmund, English Anglican clergyman and author: b. Somerton, Somerset, 14 Aug. 1844. He was educated at Oxford, was vicar of Dymock 1870-7, and of Malvern Link 1877-88. He was principal of the Theological School, Ely, 1887-90 and is a canon and chancellor of St. Paul's Cathedral. Among his published works are 'Counsels of Faith and Practice' (1883); 'The Prayer Book: its Voice and Teaching' (1889); 'The Dial of Prayer' (1901); 'Apostles of the Lord' (1901).

**Newborn**, a sect of Antinomians, which arose in the United States in the early part of the 18th century. Its founder was a German immigrant, named Mathias Bawmann (who died 1727). They held the doctrine of the deification of humanity by regeneration. They denied that the Bible was necessary for the illumination of Christians, and scoffed at the sacraments. They claimed that their regeneration or newbirth was brought about by dreams, apparitions and supernatural inspiration, and was like the new name written on the white stone and known only to him that receiveth it (Rev. ii. 17).

**Newburgh**, nū'bērg, N. Y., city in Orange County; on the west bank of the Hudson River, and on the Erie and the West Shore R. R.'s; 58 miles north of New York. The first settlement was made by emigrants from the Rhenish Palatinate, in the winter of 1708-9. They called the place, "Palatine Parish by Quassaic." The Germans were soon followed by emigrants from Great Britain, and in 1750 the English and Scotch were there in numbers sufficient to change the name to "Parish of Newburgh" in

## NEWBURGH ADDRESSES — NEWBURYPORT

memory of Newburgh, in Aberdeen County, Scotland. Before the Revolution the farmers from the river brought their produce here to be sent to market. The lumber trade was most important; ships were built for trade with the West Indies and London; and at one time whaling was an industry of Newburgh. The city occupies a prominent place in the history of the Revolution. It was Washington's headquarters from March 1782 until 18 Aug. 1783. The "Hasbrouck House," which Washington occupied in Newburgh, was purchased in 1849 by the State of New York, and is now used as a museum for Revolutionary and Colonial relics. It is in charge of a board of trustees who have had it restored as when Washington occupied it. While in Newburgh, Washington received the letter (see NICOLA, LEWIS) asking him to become king; here the army was disbanded, and from here the Newburgh Addresses (q.v.) were issued. In 1800 Newburgh was incorporated as a village, the third in the State. After its incorporation the enterprising inhabitants built turnpikes to the farming sections west of the village, and in this way secured the trade of the farmers in the vicinity. Until 1830 sailing vessels plied regularly between New York and Newburgh, but after that date steamboats were used. The opening of the Erie Canal diverted considerable trade from the village. The first general rowing regatta on the Hudson River was held here in 1837. Others followed in 1840, 1841, and 1842. The country around has many places of historical interest. (See NEW YORK.) It was granted a city charter in 1865.

The city, viewed from the Hudson River, presents a pleasing arrangement of terraced slopes, broad, clean streets, many trees, and beautiful buildings. It is about 310 feet above the river, or Newburgh Bay, as the river expansion here is called. It is in an agricultural region, the commercial centre of an extensive section and of a number of large industries. The chief manufactures are machine-shop products, plaster, cotton and woolen goods, felt hats, silk, leatherette, powder, paper, carpets, flour, lumber, foundry products, dairy products, overalls, and cigars. It has ship-yards, extensive coal, brick, and lumber yards. Large quantities of coal from Pennsylvania are brought here to be loaded in coasting vessels and barges. There are over 4,000 employees in the industrial establishments. On the northeast corner of the grounds surrounding the "Headquarters" is the "Tower of Victory," made of stone, 53 feet high, with four archways leading into an atrium, and stairways leading into a belvedere. It contains a bronze statue of Washington, copied by O'Donovan from Houdon's model. Other statues represent the soldiers in the War of the Revolution. A tablet bears an inscription telling that the monument was erected by the authority of the Congress of the United States and of the State of New York. It cost \$67,000. The block of brownstone near the entrance marks the grave of Uzal Knapp, the last survivor of Washington's Life Guard; died in 1856. Newburgh has the first free public library in the State, a hospital, orphanage, and Home for the Friendless. Its educational institutions are five large public schools, two large parish schools (R. C.), a free academy, Saint Patrick's Academy, and Mount Saint Mary's Academy. There are 25 churches,

one of them for colored people. The three banks and one trust company have a combined capital of \$1,370,000; the annual amount of business is about \$3,000,000. The revised charter of 1898 provides for a mayor and council. The mayor holds office two years; the council has 13 members. The board of education, almshouse commissioners, and water commissioners are chosen by popular vote; the city clerk is elected by the council, and other administrative officials are appointed by the mayor subject to the approval of the council. The city owns and operates the waterworks. Pop. (1890) 23,087; (1900) 24,943; (1910) 27,805. Consult: Ingersoll, 'Handy Guide to Hudson River'; Nutt, 'Newburgh: Her Institutions, Industries, and Leading Citizens' (1891); Ruttenber, 'Town of Newburgh'; Powell, 'Historic Towns of the Middle States.'

FREDERICK W. WILSON,

*Editor 'Newburgh Daily News.'*

**Newburgh Addresses**, in American history, a term applied to two anonymous letters, appearing in 1783, after the close of the Revolution. They were written upon behalf of the American soldiers whose pay had been withheld. It was afterward made known that General John Armstrong was the author of the letters.

**Newburgh Sedition**, in American history; while Gen. Washington had his headquarters in Newburgh, on the Hudson, December 1782, great dissatisfaction manifested itself among his officers, and they addressed a memorial or "round robin" to Congress, demanding their back pay, and security for future services. Congress refused to grant the demands, and in the following March an attempt was made to inaugurate a revolt. The matter became so serious that Washington appeared before a meeting of the malcontents and delivered such a patriotic address that the spirit of insubordination immediately disappeared.

**Newburyport**, nü"bür-i-pört', Mass., city and one of the county-seats of Essex County, on the Merrimac River, three miles from the sea, 35 miles northeast of Boston and on the Boston & Maine railroad. It extends for about three miles along the bank of the river, but the streets leading back from the river are short; High Street, the principal residence street, lies parallel with the river, and State Street, the chief business street, is perpendicular to it. In the upper part of the city the river is crossed by a chain bridge (built 1792), the first suspension bridge in America. Among the notable buildings are the Putnam High School, the Anna Jacques Hospital, the Y. M. C. A. Memorial Building, the Old South Church, which contains the remains of George Whitfield, and the public library, formerly the old Tracy mansion, where Washington and Lafayette were entertained; the library contains about 40,000 volumes. The house in which William Lloyd Garrison was born is also in the city. In the days of wooden sailing vessels, the chief industry of Newburyport was shipbuilding, and many of the most famous clipper ships were built there; some small vessels are still built. The harbor is good, but access to it difficult on account of the shifting sand bar at the mouth of the river; there is a considerable trade in coal brought to the city by coasting schooners. The more important industries now include boot and shoe factories, cotton fac-

## NEWCASTLE

tories, hat shops, an iron foundry, and a silver factory. The mayor, city council and board of aldermen are elected annually. The city owns and operates its waterworks, which were bought from a private company after considerable litigation. Newburyport was settled about 1635, separated from the town of Newbury in 1764, and chartered as a city in 1851. It sent a large quota of troops to the Civil War, and many of its citizens, who were sea-captains, received money from the Alabama claims. Pop. (1910) 14,949.

**Newcastle, Margaret, DUCHESS OF.** See CAVENDISH, MARGARET.

**Newcastle, Thomas Pelham Holles, 1ST DUKE OF,** English prime minister: b. England, 1693; d. August 1768. He was the son and heir of the 1ST Lord Pelham and as one of the largest land-owners in England his influence, which he used freely in the service of the king, won favor at court and he was made Duke of Newcastle in 1714. He was appointed secretary of state in 1724, under Walpole, and though not a man of brilliant ability held this post until he became prime minister in 1754. He retired in 1756, but was recalled in 1757 and formed the ministry so notable because of the brilliancy of Pitt. He again resigned in 1762, and afterward lived a retired life with the exception of holding for a few months in 1765 the office of Lord Privy Seal.

**Newcastle, William Cavendish, DUKE OF.** See CAVENDISH, WILLIAM, DUKE OF NEWCASTLE.

**Newcastle, Del.,** city in New Castle County; on the Delaware River, and on the Philadelphia, B. & W., and the Philadelphia & R. R.R.'s; about seven miles south of Wilmington. It was settled, in 1640, by Swedes. Later it was occupied by the Dutch and then by the English. In 1875 it was incorporated. Newcastle was the place where, in 1682, William Penn landed in America. It is in an agricultural region where much attention is given to fruit orchards and market gardens. Its good harbor, regular steamer connection with large cities, and railroad facilities make it an excellent shipping point for farm products, fruit, and vegetables. Considerable fish, especially shad, are caught in the nearby waters. Its chief manufactures are flour, brick, canned goods, woolen and cotton goods, iron products, and men's under-clothing. Newcastle has a library founded in 1812, several buildings dating back to Colonial times, and a number of fine modern houses. Pop. (1910) 3,351.

**Newcastle, Ind.,** town, county-seat of Henry County; on the Blue River, and on the Pittsburgh, C., C. & St. L., the Cleveland, C., C. & St. L., and the Lake Erie & W. R.R.'s; about 40 miles northeast of Indianapolis. It is in a fertile agricultural and also a manufacturing region. The chief manufactures are agricultural implements, flour, paper boxes, iron and steel products, bridge works, pianos, brass furniture, carriages, brick, and furniture. It has natural gas, good water-power, and excellent transportation facilities. The city owns and operates the street-lighting plant and the waterworks. Pop. (1910) 9,446.

**Newcastle, Pa.,** city and county-seat of Lawrence County; situated about 50 miles north of Pittsburgh, at the confluence of the Shenango, the Neshannock, and the Mahoning rivers, which there form the Beaver River, and on the Pennsylvania, the Baltimore & O., the Erie, the Pittsburgh & L. E., and the Buffalo & Pittsburgh R.R.'s. Branch roads also run into the city, the Erie & Ashtabula there splitting into the Youngstown & A., the Erie & Pittsburgh and the Western N. Y. and P., which latter is now under the control of the Pennsylvania. The city covers an area of 4,773 acres and, situated as it is in one of the richest and most charming valleys in the world, and having unequalled advantages of water power and railway facilities, it offers exceptional opportunities to the ever increasing population.

**Industries.**—Aside from being the commercial centre for a productive agricultural region, the city is in the heart of rich deposits of iron ore, limestone, coal, and clay, and is noted for its great variety of industries. The largest blast furnace, two of the largest tin plate mills, the largest cement works in the world, are located there, while according to population the city has relatively the largest freight tonnage in the United States, in 1903 reaching the total of 15,000,000 tons. The United States census of 1900 gives the following figures for the manufactures: number of establishments, 216; capital, \$13,308,220; average number of wage earners, 4,992; wages, \$3,226,669; cost of material used, \$13,646,648; value of products, \$21,046,842. Even since then the industries have grown enormously, as the following figures, compiled in 1904, will show: pig-iron, 950,000 tons; window glass, 14,000,000 square feet; muck bar, 26,600 tons; sheep, 39,125 tons; brick, 30,000,000; stoves, ranges, etc., 15,000; bolts, nuts, etc., 180,000 tons; clay, 10,000 tons; limestone, 2,000,000 tons; asphalt block, 2,500,000; sand, 10,000 tons; sandstone, 150,000 tons; enamelled ware, 6,240,000 pieces; fine china to the value of \$500,000; artificial ice, 90,000 tons; wire novelties, 150 tons; finished lumber, 15,500,000 feet; coal, 1,000,000 tons; while the value of the iron and steel output alone is about \$25,000,000. Among other manufactures are machinery, boilers, castings, blast furnace jackets, pottery and table ware, and vitreous sanitary ware. In these industries are employed 10,000 persons, of which the iron and steel mills and blast furnaces employ more than one-half.

**Banks.**—The city has six banks with a combined capital of \$1,225,000, deposits of \$7,000,000, and surplus of over \$1,650,000. One of the national banks ranks sixth in the list of national banks of the United States.

**Public Buildings, Charitable Institutions, etc.**—Prominent among the public buildings are the United States Government Building, containing the Post-office which has receipts of nearly \$18,000 and a net income of over \$9,000, the city hall, the opera house, and the Y. M. C. A. building, containing a large library, presented by Ira D. Sankey the evangelist. The Shenango Valley Hospital and the Almira Home for Aged Women are located there.

**Churches and Educational Institutions.**—The inhabitants of the city worship in 35 church edifices representing nearly all denominations. The educational advantages are of the highest standard of excellence; the pupils are accommodated

## NEWCASTLE-UPON-TYNE

and receive instructions in a high school supplemented with 13 graded public schools, while a well sustained business college prepares young men and women for commercial life. Besides these there are also several excellent parish schools.

*The Press.*—There are published in the city two daily and four weekly newspapers in English, beside one monthly. The Press Club, composed of "Knights of the Pencil" is one of Newcastle's popular organizations.

*Public Works, Parks, etc.*—Newcastle is the second city in Pennsylvania in the average of highways paved, and outranks all other cities of its size in the country in that respect; the public improvements have practically all been the outcome of the marvellous growth of the city within the last 10 years; during that time the electric railway system, operating over 20 miles of track and connecting with all the surrounding cities and towns, has been built; a complete system of arc lights has been introduced, the capacity of the water system trebled, and an excellent sewerage system constructed.

Cascade Park, an amusement resort, was established by the traction company. The Old Park Cemetery and the Graceland Cemeteries are the largest of the "cities of the dead."

*History, Government, etc.*—Newcastle was first settled in 1800 by Robert White; became a borough in 1869, and was chartered as a city in 1875. Under the revised charter of 1887 the affairs of the city are administered by a mayor, elected for a term of three years, and a council consisting of two legislative bodies, the Select Council of seven members, who confirm the appointments of heads of administrative departments made by the mayor, and the Common Council of 14 members. The city has also street, fire, police, health, and charities departments.

Of the population, Americans form the predominating element, with 25,000, followed by Welsh 5,000, Italian 3,000 and Polish 2,000. Pop. (1890) 11,600; (1900) 28,339; (1910) 36,280.

S. JAMES CALLAHAN,

*Secretary Chamber of Commerce.*

*Newcastle-upon-Tyne, England, Geographical Description.*—Newcastle-upon-Tyne is a parliamentary, municipal and royal borough, an episcopal city, and also a city and county of itself. It is a famous river port, as size and market town, and is a Poor Law Union of 11 parishes. It is on the northern bank of the Tyne, nine miles from its mouth. It is about 272 miles N.N.W. by rail from London, 124 miles S.E. from Edinburgh, and 143 N.N.E. from Manchester. It occupies the sides and summits of hills that rise steeply from the river. The ratable value of the city is £1,614,097.

*Geological Formation.*—Coal measures constitute the geological formation; and they stretch southwards to Ferry Hill, northwards to Chevington. It is to the coal trade indeed that Newcastle owes much of its wealth and fame. In 1239 it received a charter from Henry III conferring the right of digging for coal in the neighborhood; and the proverb "carrying coals to Newcastle" is no less familiar than the old saying taking "owls to Athens."

*Public Buildings.*—The principal public build-

ings are the Moot Hall (built 1810—in it the assizes for the county of Northumberland are held); the Hancock Museum (containing the collection of the Newcastle Natural History Society, the collection of John Hancock the naturalist, and many drawings of birds, etc., by Thomas Bewick, the engraver); the Keep of the old Castle, once the New Castle upon the Tyne (this Keep, which is all that remains of the castle itself, took five years to build in Henry II's reign, and cost over £900—in those days a large sum); the Black Gate, at the entrance to the Castle yard (now used as a Museum for Roman and other antiquities). The Keep itself, long used in part as a prison ("where is kept the sons of Belial," as an old phrase has it) is now occupied by the Society of Antiquaries. Of other buildings there may be mentioned the Town Hall (little esteemed); the Old Assembly Room; the Guildhall (in which is the assize court of Newcastle), and below it, the Exchange; and the Grain Warehouse, on the Quayside, the machinery of which elevates, carries, weighs and distributes grain from a ship's hold to the storage floors at the rate of 60 to 80 tons an hour. Of the theatres the chief are the Tyne Theatre and the Theatre Royal.

*Public Libraries.*—(1.) The Central Lending Library was built in 1879-80. It incorporated the old Mechanics' Institute, and was built partly on the site of the Carliol Tower—one of the old towers of the town wall. It cost over £20,000 to make ready for opening. The Reference Library was opened by the Prince of Wales (now king Edward VII) in 1884. The two existing Branch Libraries were built and presented to the city by Sir W. H. Stephenson. Mr. Andrew Carnegie promised Benwell (before its incorporation with Newcastle) £4,000 for a library, and adheres to his intention since the incorporation. Total volumes in all departments 135,000. (2.) The library of the Lit. and Phil. (i. e. the Literary and Philosophical Society). This society was founded in 1793 and has been prominently associated with the intellectual life of the town. In 1825 the society had its first meeting in the new and permanent premises, of which the site and building had cost £13,756. Practically from the foundation of the society lectures were given, and a large library (70,000 vols.) had also grown up. In 1893 a destructive fire broke out during the night in which the centenary had been celebrated; £10,648-14-2 was received from the insurance company. (3.) Library of the Society of Antiquaries. (4.) Library of the Church Institute.

*Art Galleries.*—The Laing Art Gallery adjoins the Central Public Library. It was presented to the city in 1904 by Mr. Alexander Laing, and cost nearly £25,000. Exhibitions of pictures are also held from time to time in the Academy of Arts (Blackett street) and elsewhere.

*Places of Worship.*—The Cathedral Church of Saint Nicholas has a famous lantern tower, which was added by Robert de Rhodes about 1450, 100 years after the completion of the church. The tower has been copied elsewhere, but never equalled. Of late years extensive alterations and repairs (costing £21,400) have

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been carried out in the cathedral. The clock weighs two tons, and is controlled from Greenwich. New peals of bells, 1892; the largest weighing 5 tons 18 cwt. Saint Andrew's is said to be the oldest church in Newcastle, but Saint John's disputes the claim. Saint Mary's Cathedral (Roman Catholic) was designed by Pugin; its charming spire was added in 1872. There are many other churches representing the various Protestant denominations.

*Schools, Educational Institutions, etc.*— Dame Allan's School, Saint Cuthbert's Grammar School (R. C.), Deaf and Dumb Institute, Northern Counties Orphanage, Church High School for Girls, Central High School, etc. The Royal Grammar School has just built a large and fully equipped new school. The Armstrong College was founded in 1871 by the University of Durham (to which it is affiliated) and the North of England Institute of Mining and Mechanical Engineers. The College of Medicine (also affiliated to the University of Durham) was built in 1887, and cost £31,000. Rutherford College, not affiliated to the University, was founded by the late Dr. Rutherford.

Other institutions or societies are the Mining Institute and Wood Memorial Hall (Neville Hall adjoining the Lit. and Phil.); Tyne Improvement Commission; River Tyne Port Sanitary Authority; North East Coast Institution of Engineers and Shipbuilders; Trinity House, etc.

*Municipal Enterprises.*— The chief municipal undertakings are the markets, the public libraries, fire brigade, electric tramways (the construction account a few months after the opening of the new system in 1902 was given as £673,337), baths and washhouses.

*Parks, Hospitals, Bridges.*— Town Moor (said to have been held by the burgesses from time immemorial) 927 acres; Leazes, 86 acres; other parks and recreation grounds, 270 acres. The old Royal Infirmary is near the Central Station. About 10 years ago it was proposed to build a new one to commemorate the Diamond Jubilee of Queen Victoria's reign. Over £300,000 have been contributed since then, and the new Royal Infirmary has been erected on the Leazes, close to the Armstrong College. It was opened by the King in July, 1906. Other hospitals, etc., are the Eye Infirmary, Fleming Memorial Hospital for Children, Hospital of Diseases of Throat and Ear, for Incurables, etc. The chief bridges over the Tyne are the High Level (built by Robert Stephenson, 1846-50, at a cost of nearly £500,000); the Redheugh (built 1871, renewed without interruption to traffic 1896-1900); the hydraulic swing bridge (built by Lord Armstrong at a cost of £233,000); and a new railway bridge (North Eastern Railway), opened by the King in July 1906. The Byker Bridge (built 1876 and widened recently without interruption to traffic) crosses the Ouseburn and serves foot and vehicular traffic; whilst a railway viaduct, just to the north of it carries the traffic of the N. E. R.

*Industries and Manufactures.*— The coal mines are now all outside the city boundaries. The most notable industries of Newcastle itself are engineering and shipbuilding. To them may be added the trade in lead, chains, and

anchors, the manufacture of cement, of steam winches and windlasses, of cordage and cable, paper, cranes, pumps, and electric machinery. The chemical trade, formerly active, has declined of late years. The chief imports are ales, wines, and spirits, box and bale goods, canvas, jute, hemp, clay, colonial produce, and wheat, grain, provisions, glass, lead, livestock, salt, slates, tallow, skins, esparto grass, timber, etc. The chief exports are coals, machinery, chemicals, manures, cement, manufactured iron, paints, tar, fire-bricks, fire-clay, etc. According to the Tyne Improvement Commissioners' Tables the total amount of coal and coke exported in 1905 (foreign and coastwise) was 16,455,557 tons; being an increase of 663,151 tons over that of the previous year. The total number of steam and sailing vessels which have paid Tyne piers dues during 1905 is 13,154 (of registered tonnage, 8,396,812 tons). In 1904 the number was 13,169 (of 8,192,856 tonnage).

*History.*— The town (first called Pons Ælii, then Novocastria, then Monkchester, then Newcastle-upon-Tyne) is situated near the eastern termination of the Wall of Hadrian, and Roman antiquities have been repeatedly discovered in it. In the Anglo-Saxon period it was a monastic centre. The fortress was built by Robert, son of William the Conqueror, about 1080. It was rebuilt by William Rufus, his younger brother, who "buiylded the Newcastle upon the Tyne, the Scotts for to gaynstande and to defende." About this time the town received its present name. It received a charter from King John, but the oldest extant is said to be by Henry III in 1239, which confers the right of digging for coal in the neighborhood. The coal trade had attained some importance by 1280. Newcastle was a frequent object of attack, and was repeatedly taken in the wars between England and Scotland. It furnished 17 ships to Edward III for the siege of Calais. It was taken by the Scottish Covenanting army in 1640 and in 1644, and in 1646 Charles was delivered here by the Scottish army to the parliamentary commissioners.

*Government.*— Lord Mayor, Sheriff, Council. In the City Council there are 19 aldermen and 57 councillors. Special departments of corporation work are carried on by the 24 committees and 62 sub-committees. In the year 1400 a royal charter created Newcastle a county in itself, and Newcastle's first sheriff was appointed in that year. In 1600 the great charter (confirming old privileges and adding new ones) was passed. In 1882 a royal charter created Newcastle a city. In 1906 it was made a royal borough.

*Area and Population.*— The area of the municipal borough is 8,453 acres; that of the parliamentary borough is 5,355 acres, this being the largest undivided constituency in the Kingdom. In 1904 the neighboring districts of Walker, Benwell and Fenham, and part of Kenton were incorporated. Pop. (1881) 146,000; (1891) 186,300; (1901) 214,800; (1906) 264,500.

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BASIL ANDERTON,

*Public Librarian, Newcastle-upon-Tyne.*

**Newcomb, nū'kom, Harry Turner**, American statistician: b. Owosso, Mich., 4 Jan. 1867. He was graduated from the law department of Columbian University in 1891, and entered the offices of the Chicago, Milwaukee & St. Paul railroad in 1882. In 1895-9 he was chief of the transportation department of the division of statistics in the United States department of agriculture, and in 1899-1901 was expert chief of the division of agriculture for the United States census. In 1896-1901 he was lecturer on statistics at Columbian University, and in 1901-3 he was editor of the 'Railway World.' He has written: 'Railway Economics' (1898); 'The Postal Deficit' (1900); etc.

**Newcomb, Simon**, American astronomer: b. Wallace, N. S., 12 March 1835; d. Washington, D. C., 11 July 1909. He came to the United States in 1853 and taught in Maryland; computed on the 'Nautical Almanac' at Cambridge 1857, and was graduated from the Lawrence Scientific School at Harvard 1858. He was appointed professor of mathematics in the United States Navy in 1861 and assigned to duty at the Naval Observatory; negotiated contract for and supervised construction of the great telescope; was secretary of the transit of Venus commission (1871-82); and observed transit at the Cape of Good Hope in 1882. He also has directed several parties to observe eclipses beginning in 1860. From 1877-97 he was senior professor of mathematics and superintendent of the Nautical Almanac Office. He retired from active duty in the navy (1897) at the required aged of 62, and has since devoted himself to both pure and popular science. He was professor in Johns Hopkins University 1884-93 and editor of the 'American Journal of Mathematics,' retiring in 1901. He is a member of the Royal Academies of Bavaria, Leyden, Upsal, Stockholm, Prussia, Brussels, Ireland, Rome, Lombardy, and New South Wales; of the Royal Society, the Royal Institution and Royal Astronomical Society of Great Britain, the Sociedad Astronomica de Mexico, the Königliche Gesellschaft der Wissenschaften (Göttingen), and the Russian Astronomical Society; he is also associate fellow American Academy Arts and Sciences, an honorary member of the Imperial Academy of Sciences (St. Petersburg), of the Cambridge Philosophical Society, of the Philosophical Society of Philadelphia, of the Imperial Geographic Society of Russia (1897), and of the Society for the Encouragement of Arts, Manufacture, and Commerce (London, 1897). Since 1874 he has been correspondent and since 1893 associate of the Institute of France, being the first native American to receive the latter honor since Franklin; he is also an officer of the Legion of Honor. He has been president of the Political Economy Club,

of the American Association for the Advancement of Science (1887), of the Society for Psychological Research (1885-6), of the American Mathematical Society (1897-8), of the Astronomical and Astrophysical Society of America since its foundation in 1899; vice-president of the National Academy of Sciences (1883-9) and its foreign secretary (1903). He was president of the International Congress of Arts and Sciences at St. Louis (1904). He has received the Royal Astronomical Society medal (1874), the Huygens medal (1878), the Copley medal of the Royal Society (1890), the Bruce medal of the Astronomical Society of the Pacific (1898), the Schubert prize from Russia, two bronze vases from Tokyo University, vases from the Imperial Observatory of Russia, and the Sylvester medallion from Johns Hopkins. In 1887 the Russian government ordered his portrait for the Royal Observatory, and in 1897 it was painted for the Johns Hopkins. Among his degrees are: LL.D. from Columbian 1874; Yale 1875; Harvard 1884; Columbia 1887; Edinburgh 1891; Glasgow and Princeton 1896; Cracow 1900; Johns Hopkins 1902; Sc.D. Heidelberg 1886; Padua and Dublin 1892; D.C.L., Oxford 1899; Dr. of Math. Christiania 1902; Master of Mathematics and Dr. of Natural Philosophy, Leyden 1875; Dr. of Science, Cambridge 1896.

He has lectured at Harvard, the Lowell Institute at Boston, etc., and has delivered opening addresses at the Flower, Yerkes, and other observatories. In connection with his work on Mathematical Astronomy, besides over 100 papers published in various scientific journals, he has written large works 'On the Secular Variations, and Mutual Relations of the Orbits of the Asteroids' (1860); 'An Investigation of the Orbit of Neptune' (1874); 'Researches on the Motion of the Moon' (1876); 'Theory of the Inequalities in the Motion of the Moon' (1894); 'Tables of Uranus'; 'Measure of the Velocity of Light' (1884); 'Uranian and Neptune System'; 'Astronomical Constants and Eclipse Tables.' He founded the Astronomical Papers of the American Ephemeris, and edited the first eight of this series, which contain his tables of the planets and of the stars now used by astronomers all over the world. Among his more popular writings are 'Popular Astronomy' (1878); 'School Astronomy'; 'Elements of Astronomy' (1900); 'Algebra Geometry'; 'Analytical Geometry'; 'Calculus'; 'Essentials of Trigonometry'; 'The Stars' (1901); 'Astronomy for Everybody' (1902); 'A B C of Finance'; 'A Plain Man's Talk on the Labor Question' (1886); 'Principles of Political Economy' (1887); 'His Wisdom the Defender' (1900); 'Reminiscences of an Astronomer' (1903).

**Newcomb Memorial College for Women**, New Orleans. See TULANE UNIVERSITY.

**Newcomen, nū-kōm'ēn, Thomas**, English inventor of the atmospheric steam pump: b. Dartmouth, Devonshire, February 1663; d. London August 1729. With the financial help of John Cawley he experimented on Savery's engine, patented 1698, and possibly had made previous study of the same problem at an earlier date. His improvement of Savery's engine consisted principally in separating boiler, pump, and condenser. Steam was let into a cylinder from below, and a piston above was thus forced up

so that a pump rod attached to it by a balance arm was driven downward; cold water was then introduced into the condensing cylinder, a vacuum was there formed, and the external atmospheric pressure drew the piston down into the cylinder, the pump rod being forced up by this action. Newcomen's engine is practically the modern type, which, however, has Watts' condenser; it was successfully used, notably for pumping water from mines. An engine after Newcomen's model built in 1745 is still in use in the mines of the Ashton Vale Iron Company near Bristol. See STEAM ENGINE.

**Newcomes**, nū'kūnz, *The*, a novel, by W. M. Thackeray, published in 1854. It presents a lifelike picture of English society in the first half of the 19th century, and excels in the presentation of individual types. In Colonel Newcome we are shown perhaps the most perfect type of a gentleman to be found in the whole range of fiction.

**Newdigate** (nū'dī gāt) *Prize*, a prize in Oxford University, annually awarded for an English poem. It was founded by Sir Roger Newdigate, Bart. (1719-1806), its value being \$110. Among the winners have been several well-known men, such as Ruskin, Matthew and Sir Edwin Arnold, John Addington Symonds, and W. H. Mallock.

**Newel**, in architecture, the central space or column round which the steps of a circular staircase are wound. When there is no central pillar the newel is said to be open. The term *newel post* is also used in this connection.

**Newell**, nū'ēl, **Peter** ("SHEAF HERSEY"), American illustrator and humorist; b. McDonough County, Illinois, 5 March 1862. He was educated at Bushnell, Ill., worked for a photographer, drew crayon portraits, studied in New York at the Art Students' League, and in the early nineties became famous for his whimsical illustrations to humorous books and for his own pictures with text, which appeared in various periodicals and were collected as 'Topsy and Turvy' (1893-4), 'Peter Newell's Pictures and Rhymes' (1899), etc. His later work with its striking use of flat tones, possibly traceable to Japanese influence, is to be seen in the illustrations to Lewis Carroll's 'Alice in Wonderland,' 'Alice in the Looking-Glass,' 'The Hunting of the Snark'; 'Mr. Munchausen'; 'Book of Clever Beasts'; etc.

**Newell, Robert Henry**, American humorist, whose pseudonym was "ORPHEUS C. KERR," that is "Office Seeker"; b. New York 13 Dec. 1836; d. Brooklyn 1 July 1901. He was educated in New York; became assistant editor of the 'Sunday Mercury' in 1859; for it wrote his first 'Orpheus C. Kerr papers,' which were continued in three volumes (1861-4), none possessing much deeper humor than the kind suggested by the title. He was a war correspondent of the New York *Herald*; acted as an editor of the New York *World*, then of the *Daily Graphic*, and later of the 'Hearth and Home,' which he left in 1876. In 1878 he began to suffer with writer's cramp and letter-blindness, from which he never recovered. Besides his humorous sketches Newell wrote: 'There Was

Once a Man,' an anti-Darwinian romance (1884); 'Avery Glibb' (1867); 'The Palace Beautiful' (1865), and 'Versatilities' (1871), both volumes of verse; 'The Cloven Foot,' an adaptation of 'Edwin Drood' (1870); and 'The Walking Doll,' a novel of New York life (1872).

**Newell, William Wells**, American folklorist; b. Cambridge, Mass., 24 Jan. 1839. He was graduated from Harvard in 1859 and from the Harvard Divinity School in 1863, and entered the Unitarian ministry, but retired from that profession to become a teacher and writer. He is secretary of the American Folk-Lore Society and in 1888-1900 edited the 'Journal of American Folk-Lore.' He has written 'Games and Songs of American Children' (1883; 2d ed., 1903); 'King Arthur and the Table Round' (1897); 'Sonnets and Madrigals of Michelangelo Buonarroti' (1900); 'Legend of the Holy Grail' (1902); 'Words for Music,' in verse, (2d ed., 1904); etc.

**Newfoundland**.—*Geography*.—Newfoundland, the tenth largest island in the world is situated on the east coast of North America, between latitude 46° 37' and 51° 39' N., and longitude 52° 35' and 59° 25' W. It occupies much the same geographical position in the new world as the British Isles do in the old. The colony lies generally in a more southern latitude than the British Isles. It is larger than Ireland, containing 40,200 square miles. It is divided from the continent on the southwest by Cabot Straits, about 50 miles wide, and on the northeast by the Straits of Belle Isle. It juts far out into the Atlantic and is the nearest American land to Europe, being only 1,690 miles from Ireland and 1,213 from New York.

*Topographical Features*.—On the east coast the land is high and looks very rocky and barren; on the west coast the character of the country changes completely after Cape Ray is passed. Instead of the stern, forbidding, mountainous aspect of the east and south coast the land is level, well timbered and fertile. An American artist has declared that the scenery of Bay of Islands on the Newfoundland west coast is the most picturesque in North America. The numerous river valleys are very beautiful, especially the Humber, Codroy, etc. Much of the interior is moorland and marsh, well wooded around the numerous lakes and rivers. Most of the good land lies in these alluvial valleys. The west has a finer climate and the land generally is superior to the soil of the eastern shore. In the interior there are many isolated peaks. The chain of mountains known as the Long Range extends from Cape Ray for about 100 miles into the interior. There is another high range of mountains near the centre of the island. The highest peak is a little over 2,000 feet. The Atlantic coast line of Newfoundland and the southern shore have noble inlets, bays, and harbors, admirably adapted for carrying on its great industry, the cod fishery.

*Hydrography*.—The peculiar feature of Newfoundland are the innumerable lakes, only two of which are large, Grand Lake and Red Indian Lake. Both are long and narrow, Grand Lake about 60 miles long and Red Indian Lake about 50; but neither is over 10 miles wide in any part.

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**Glover Island** in Grand Lake is 52 miles long. The largest river in the island is the Exploits, which is navigable for about 50 miles from the mouth of its estuary. The Humber, Gander, Codroys, and Terra Nova rivers are all fine streams but of no value for navigation except by canoes.

**Soil.**—In many parts of the island there is very good land, especially in the Codroy Valley, Saint George's Bay and the Humber Valley. Deer Lake, Red Indian, Exploits arm and the River valley also contain good soil. Fine timber and good ground fit for cultivation surround both the Gander river and lake. There is also good agricultural land around Avalon Peninsula, Trinity Bay, S. W. Arm, Green Bay, Notre Dame Bay, some parts of White Bay, Mortier, Placentia, Bonavista and Saint Mary's Bays. There are thousands of acres of splendid grazing ground and fine pasture lands specially suitable for sheep.

**Minerals.**—Newfoundland is celebrated as a producer of copper and iron, copper from the well-known Tilt Cove mine, and iron, now the main supply of the Dominion and Nova Scotia Iron and Steel Company, from Bell Island. There are 40,000,000 tons in sight and it is shipped for about 25 cents a ton at Bell Island pier. Iron pyrites to the value of \$1,500,000 have been shipped to the United States from Pilley's Island mine. Iron of various kinds has been found in the north. Argentiferous galena occurs in Placentia Bay. Asbestos is common and mica. Gold is being worked on a small scale in White Bay and petroleum of excellent quality is now being pumped at Parsons' Pond on the west coast. Slate and marble are abundant. A large deposit of talc has been opened and an aerial tramway built to it near Manuels Conception Bay. The head of the Geological Survey, Mr. Howley, declares that nearly every known mineral is to be found in the colony. The country is almost wholly unexplored and her great mineral treasures, especially her valuable coal deposits, have not yet been tested in an efficient way with the boring machine. They are an extension of the Cape Breton coal fields and extend nearly across the island from Codroy to Green Bay.

**Climate.**—The Summer climate of Newfoundland from June until October is delightful. There is plenty of sunshine but no extremes of heat, seldom higher than 70° in the shade. The Winter climate is not so severe as in Canada. Zero is only occasionally touched. The Spring is late and the weather variable, due to the influence of the Labrador current which brings along the ice. During the last 20 years the climate has improved and there is now no very heavy snowfall or intense frost before the end of November. The fog lies on the coast and only rarely comes in on the land.

**Animal Life.**—Newfoundland is the home of the woodland caribou. All the interior is one vast deer park where countless thousands of these fine animals range unmolested and unseen by man. Black bears, the grey wolf, now very scarce, the lynx, foxes, beavers and otters, are indigenous. The varying hare has been introduced and now swarm all over the island. The Arctic hare is a native as well as the willow grouse and ptarmigan. There are plenty of

snipe, ducks, and geese, but no woodcock. The rivers abound with salmon and trout; there are no predaceous fishes, such as pike or pickerel.

**Agriculture.**—The main business of the colony is the fishery. Agriculture is only an auxiliary. There are 131,000 acres under cultivation or in pasture. About 54,000 tons of hay are raised; 541,000 bushels of potatoes; 11,000 bushels of oats; 65,298 bushels of turnips. There are nearly 9,000 horses; 32,742 head of cattle; 78,025 sheep, and 34,547 pigs. About \$600,000 worth of agricultural product is imported into the Colony every year from the United States and Canada, all of which could be raised in the island. The farming around the capital is excellent. On the west coast, where the very best land is situated, it is still very primitive.

**Lumbering.**—This industry has been greatly increased by capitalists from Canada and New England. The chief woods are spruce, white and yellow pine, red pine, fir, juniper birch, witch hazel, aspen, and white maple.

**Fisheries.**—The great industry of Newfoundland is the fishery, which for the last few years has formed 79 per cent. of her exports. Their value for the year 1904 was \$9,785,807, and for the year 1905, \$9,974,275. The codfishery is the largest item of the island's productions amounting in 1904 to \$7,193,063, and in 1905 to \$7,358,648. Next in importance comes the seal fishery, producing in 1904, \$562,054 and in 1905, \$745,235. Canned lobster comes to about \$500,000, and the balance is made up of whale, seal, and cod oil. The codfishery, both in extent of area and in production, is the largest in the world. The most remarkable feature in this great industry is its stability and uniform success. As certain as seed time, and harvest, there come every year to the shores of Newfoundland the regular supply of the bait fishes in orderly sequence, herring, caplin, and squid and the voracious cod. The seal fishery is much more variable, some years being a complete failure, other years a great success. The industry was formerly prosecuted in sailing vessels, now it is carried on in 23 steamers.

The herring fishery is another large industry. The movements of the fish are sometimes very irregular and the year's catches variable, unlike the steady uniformity of the codfishery which has continued for over four centuries steadily productive. The Labrador herring, once so famous, is now a thing of the past. Owing to judicious protection, salmon are year by year increasing and every season an increasing number of anglers come to enjoy the sport, principally from the United States. See NEWFOUNDLAND, THE FRENCH SHORE QUESTION IN.

**Manufactures.**—Ship building is extensively carried on in the outports of the colony. There are also a very large number of saw mills, some very small and primitive, others on a large scale with all the best and most modern appliances. Nearly all the other manufactures are carried on at the capital, Saint Johns (q. v.).

**Trade and Commerce.**—The main import trade is done with Great Britain, United States, and Canada. In 1905 there was imported from the United Kingdom merchandise valued at \$2,654,908; from America, \$2,750,114, and from the Dominion of Canada, \$4,105,569. Trade with England is decreasing whilst business with the

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States and Canada is on the increase as shown by the following table.

	1888-1892.	1899-1900, 1903-1904.
	Per cent.	Per cent.
United Kingdom.....	33.1	24.5
Canada.....	20.5	21.3
United States.....	14.5	21.1
Elsewhere.....	31.8	33.1
	100.0 ✓	100.0

The cause of this change is not far to seek. Whilst British capital has neglected Newfoundland, Canadians and Americans have been prompt to secure the advantages offered by the island's minerals and timber. They have realized that there are great possibilities in the colony. The exports of Newfoundland go principally to Brazil, the West Indies, Spain, Portugal, Italy and Greece, chiefly dry codfish. Sealskins, and oils go to the United States, England, and in small amounts to Canada. The iron ore goes to Canada, copper to England, and iron pyrites to the United States, each worth about \$500,000. Trade is steadily increasing, and the country is very prosperous.

*The Revenue* of the Colony is nearly all derived from the customs and is considerably in excess of the expenditure. For 1903-4 the imports amounted to \$9,448,664; the exports were \$10,381,897, and the revenue \$2,513,633. In 1904-5 the imports were \$10,279,293; exports \$10,669,342, and the revenue \$2,574,069. For the last five years the excess of exports over imports amounts to \$6,159,556, a considerable advantage to a population of 230,000, that has to import nearly all its food and clothing. The public debt amounts to \$22,745,809, principally incurred for railway construction and public works, and includes the municipal debt of Saint Johns.

*Means of Communication.*—A narrow gauge railway runs from Saint Johns to Port aux Basques, where it connects with Sydney, C. B., three times a week by the Steamer *Bruce*. There are also steamers running along the coast north and south. There are excellent main and branch roads. With some of the northern outports and Labrador, communication in Winter is maintained with difficulty by couriers. With the outside world, England, the United States, and Canada there are several lines of steamers all mentioned under the head of Saint Johns (q. v.).

*Education.*—This is conducted on purely denominational lines, each sect controlling its own educational money. Even the Salvation Army has its separate schools. In the capital and larger communities it works fairly well. The colleges and high schools are very efficient. In the smaller places this system of division is ruinous to good instruction. Its very worst effect is seen on some of the small islands where it actually destroys education.

*Religion.*—The principal denominations are the Church of England, Wesleyan, and Roman Catholic. The census shows 73,068 Anglicans; 75,080 Roman Catholics, and 61,388 Wesleyans; all other sects 10,599, with 3,947 persons residing at Labrador.

*Government.*—The government consists of the Governor, appointed by the Crown, a legislative council of 15 members, also appointed by the Crown for life, and a House of Assembly, consisting of 36 members, elected every four years on a manhood suffrage from 18 districts. The only town in the Colony that possesses municipal government is the capital, Saint Johns (q. v.).

*Population and Principal Towns.*—In 1901 the population of Newfoundland was 217,037, of its dependency, Labrador, 3,947. The inhabitants are chiefly of Anglo-Saxon and Irish descent. Outside of the capital there are no other large centres of population. The largest is Harbour Grace in Conception Bay, with 5,184 population; Bonavista, 3,696; Twillingate, 3,542; Carbonear, 3,703; Burin, 2,719; Bay Roberts, 2,226.

*History.*—The early history of the Colony involves the story of the discovery of North America by John Cabot in 1497, a memorable voyage fraught with far reaching consequences to the world, as it gave this great continent to the English by the indefeasible right of discovery. The immediate result of the discovery was the springing up of a great Trans-Atlantic codfishery which first drew Britons from the narrow seas, made them a nation of sailors, and laid the foundation of the British Colonial Empire. For a long time this industry was carried on secretly to avoid the exaction and tyranny of the Crown. There was not only a great fishery but a big barter trade in operation between the English and foreign sailors. By the reign of Elizabeth this business carried on by Devonshire men had grown so extensive that Raleigh declared it was the mainstay of the Western Countries then the chief maritime centre of England. The story of Newfoundland naturally divides itself into four periods. First, the early period from 1497 to 1610 when there was neither law, religion, or government in the island. English and foreign fishermen were ruled in a rough way by the valiant men of Devon, traders and pirates. Second, the fishing admiral period, 1610 to 1711, a time of struggle between the settlers and the ship fishermen from England. The permanent inhabitants were very much aided by their colonial brethren from the American Colonies. Trade began with them in 1641 and so increased that by the time of the Revolution it amounted to \$4,000,000. One of the largest items in this trade was the supply of New England rum. Thousands of Devonshire men were smuggled away every year to New England and thus helped to build up the trade and fisheries of the American Colonies which became so formidable as to rival England and excited the great admiration of Edmund Burke. Third, from 1711 to 1825 when the island was under naval Governors and at last possessed a resident ruler and a form of settled administration. Fourth, the modern period from 1825 up to the present time. When first the Colony was discovered it was inhabited by a branch of the great Algonquin family of Indians known amongst themselves as the "Beothics." Their principal settlement was in the interior around Red Indian Lake. They became extinct early in the last century. Misunderstandings arose between them and the white men and the feud ended in the dire disaster to the aborigines.

## NEWFOUNDLAND

Starvation and disease combined with the dire hostility of the Mic-Macshricmac who early obtained the use of fire arms helped to destroy this interesting race.

The modern period can only be very briefly sketched. The Colony suffered severely from the policy of the Home Government which opposed settlement and tried by every means to use the island simply as a fishing station for British fishermen. No grants of land were issued until 1813. After the country obtained a local government in 1832 and full responsible government in 1855, it went ahead fast. The most wonderful feature in our Colonial history is the marvelous recuperative power of the insular population,—under the direst calamities, invasions from the French, fires, and lastly in 1892 a conflagration, which consumed half the Capital, followed in 1894 by a bank crash which financially ruined nearly every one in the island. The real advance of Newfoundland may be dated from the advent of the railway in 1881, since built right across the island, and giving us regular tri-weekly communication with the United States and Canada. The movement was bitterly opposed by the fish merchants and others but every one now recognizes its beneficial results in building up new industries. The present executive, the Bond Government, has an overwhelming majority and is doing good honest work for the island. The French shore question (q. v.) is now happily settled and it is hoped that fishery dispute with the United States will also be satisfactorily solved at an early date.

D. W. PROWSE,

*Author of 'The History of Newfoundland from the Records.'*

**Newfoundland, The Atlantic Fisheries Dispute.** This fertile source of friction between the United States and Great Britain antedates the War of Independence. In those times the American colonists, as fellow-subjects of England, prosecuted the fisheries of the Grand Banks and Saint Lawrence Gulf on equal terms with the inhabitants of Canada and Newfoundland. During the Revolution the Americans could not exercise it, but by the Treaty of 1783 they regained this liberty. The War of 1812 abrogated it again, and seizures of their vessels for attempting to prosecute the industry brought about the Convention of 1818, which fixes the status of the question at present.

The agreement of 1818 known in diplomacy as the Convention of Ghent, is somewhat remarkable. The American Commissioners claimed that they still possessed the privileges formerly enjoyed by them as British colonists although war had intervened and they had become an independent nation. The audacity of the claim startled the English Government, who answered that it was preposterous. The Americans were bold and insistent, they had many friends—and as every one desired peace and harmony the convention finally agreed on a compromise on the question. The British Government were ignorant both of the geography and the trade of Newfoundland and they considered the fishing rights they were giving away as practically valueless.

By this treaty the United States abandoned all claims to fishing within the territorial waters of the British North American possessions else-

where, in return for the right to catch fish inshore on the southwest coast of Newfoundland, between Ramea Isles and Cape Ray; on the west coast, between Cape Ray and Quirpon Isles. On the coast of Labrador, from Mont Joli, opposite Anticosti, eastward and northward indefinitely; and on the shores of the Magdalen Islands, with the further privilege of landing to dry and cure their catch on the unsettled portions of the southwest coast of Newfoundland and along Labrador.

Differences as to the extent of the territorial jurisdiction and the interpretation of the Treaty made the question one of serious menace to Anglo-American amity, owing to the vigorous stand taken by Canada (including Newfoundland) against the American fishermen, until 1854, when by a reciprocity treaty the Canadian fishery products were granted free entry into the United States. This accord was abrogated by Congress in 1866, the Convention of 1818 being reverted to. At once friction revived, and in 1871 it became necessary to conclude the "Washington Treaty," which embraced a series of articles dealing with the fishery problem. They provided for reciprocal fishing concessions in Canadian waters, and in American waters north of lat. 36°, but as Canada claimed that America secured the more valuable privileges an arbitration to dispose of this point was agreed upon. The fishery articles became operative 1 July 1873, the arbitration was held at Halifax (Nova Scotia) in 1877, and the tribunal, presided over by M. De la Fosse, Belgian Minister at Washington, awarded Canada \$5,500,000, of which \$1,000,000 went to Newfoundland. Congress abrogated the "fishery articles" in 1885, and again the Convention of 1818 governed this entanglement with the result of further trouble, so that in 1888 another fishery treaty, on similar lines to its predecessors, was arranged between the plenipotentiaries, Secretary Bayard and Mr. Chamberlain, only to be rejected by the United States Senate.

At this point Newfoundland and Canada parted company, so far as their attitude toward the United States was concerned. *A modus vivendi* for two years, to admit of the treaty being adequately considered by the Senate, had been arranged between the high contracting parties, granting American fisher-vessels, on payment of a license of \$1.50 per ship-ton, the right to enter the non-treaty waters of Canada and Newfoundland to purchase bait, ice, stores, and outfits; to transship cargoes; and to hire men. When the treaty was rejected, Newfoundland saw that fishery reciprocity between the United States and Canada was hopeless, and offered the former an accord on her own behalf. The proposal was accepted in 1890, when Secretary Blaine and Colonial Secretary (subsequently premier) Bond drafted the Bond-Blaine Convention, providing privileges for American fishermen in Newfoundland waters in return for free entry of Newfoundland fish into American markets.

When it was ready for ratification, Canada protested against it, claiming that Newfoundland should not be allowed to make such a compact without including the Dominion; and the British Government, to avert a collision between the greater colony and the smaller, pigeon-holed this draft till Canada should have had an oppor-



tunity to effect a similar understanding. But this she could not do, though the Conservative and Liberal Cabinets both sought terms from Washington, and as neither Canada nor Newfoundland dared abrogate the *modus vivendi* while hoping for a solution of the deadlock, the temporary arrangement continued year after year. In 1902 Canada withdrew her protest, and Sir Robert Bond revived the moribund draft, with Secretary Hay, the new one being known as the Bond-Hay Treaty, and containing improvements suggested by 12 years of discussion.

In 1904 the United States Senate "amended this to death," at the instance of the New England fishery interests, and then Newfoundland resolved to cancel the *modus vivendi*. This her Legislature did by an enactment in April 1905 excluding all American fishing vessels from her non-treaty waters, save for wood, water, shelter or repairs, privileges conceded by the Convention of 1818; and, as regards her treaty waters, restricting them to the mere rights that compact assured to them. The first effect was to hamper them in securing bait for their deep-sea fishing, for which Newfoundland is the natural base, because of its proximity to these shoals. The second was to partially destroy the winter herring fishery on the West Coast. Here they have treaty rights, but these are not ample enough to enable them to prosecute this industry successfully, as they need large numbers of coastfolk for netting and the use of the strand for salting or freezing the fish, and the residents were forbidden to work for, or sell to them; it being usual for the Americans previously, with the approval of the Colonial Government, to buy whole cargoes from the settlers who caught the fish. The withdrawal of these privileges seriously hampered the Americans and lessened their catch. They would, indeed, have fared even worse but that they succeeded in evading the Colonial Laws by inducing the coastfolk to proceed outside the three-mile limit and hire on board their ships there, returning then into territorial waters and serving as members of their crews.

This claim of the Americans to ship Newfoundlanders outside the three-mile limit and then return with them into port as legally part of their crew has not been confirmed at Washington. The State Department has discountenanced it and instructed the American fishermen that they may only bring into Newfoundland waters crews shipped in American ports.

Newfoundland, early in 1906, passed a further Act making it illegal for any of her people to leave her waters for such a purpose, or for any foreign fishing vessel to enter her waters with such men on board, while the Americans were also required to pay light dues, observe colonial fishery regulations and enter and clear at the custom-houses, which obligations they had declined to subscribe to since the rupture. On one of these questions the claim of the Newfoundland Government to compel all American vessels to enter and clear at the Custom House is unanswerable. All nations have an inherent right to protect their revenues from smuggling. The supply of goods aboard their schooners known as "the slop chest" is solely for this purpose. Canada has always compelled them to enter and clear their vessels when visiting Dominion ports and Newfoundland claims the same

right. The United States Government does not uphold its fishermen on this point. The payment of light dues rest upon the same basis. The most contentious question is, how far are the Americans bound to obey local fishery laws? Where these regulations are general and simply for the protection of the species from destruction, it would seem reasonable that they should be obeyed. One point on which there has been some friction lately is the right of the Americans to fish on Sunday. This irritates the Newfoundlanders more than anything else and caused the trouble years ago known as "the Fortune Bay Outrage." As grave international problems were involved in the whole question the British and American Governments opened negotiations for an adjustment of it, but this was not reached until 7 Sept. 1910.

Taken altogether the award was a victory for the United States. Neither British imperial or colonial authorities can compel American fishermen to report to the custom houses, nor can they impose upon these fishermen light, harbor, or other dues. Hereafter American fishermen can employ Newfoundlanders on their vessels, and they will also have the right to purchase supplies and enjoy other commercial privileges in Canadian ports. It was also specified by the tribunal that future disputes regarding fisheries regulations shall be adjusted by an impartial commission selected for that purpose.

Hon. Elihu Root was the chief pleader for the United States at The Hague, while Sir William Robinson appeared for Great Britain.

While the award was announced on 7 September, it did not become irrevocable until five days later, during which time either nation could have filed a protest. The fact that this was not done was held to be impressive testimony to the justice of the verdict.

P. T. McGRATH,  
Editor 'The Evening Herald,' Saint Johns, N. F.

**Newfoundland, The French Shore Question in.** The long-standing dispute between England and France about fishing rights in Newfoundland is generally known as "the French Shore question." Most writers begin its history with reference to the Treaty of Utrecht, 1713, when, by agreement between the two countries, certain privileges were given to the French on the west and northeast coast of Newfoundland. It really commences, however, with the defeat of the Invincible Armada. The extinction of Spain's naval power by that great victory left the two great powers face to face, and from this date begins the long duel between France and England for the command of the sea and the control of North America. The contest ended disastrously for France at the fall of Quebec and Trafalgar. Both her naval power and her great American Empire disappeared. All that now remained to her of New France were the two barren islets of Saint Pierre and Miquelon and the doubtful fishery rights in Newfoundland. It was the sentimental and national feeling involved in this dispute that made it so difficult to settle. The French claims are based on the Treaties of Utrecht, 1713, Versailles and Paris, the main basis being the first of these agreements. It begins with de-

## NEWFOUNDLAND DOG—NEWGATE PRISON

claring that the island of Newfoundland shall belong of right wholly to Great Britain. Moreover, it shall not be lawful for the subjects of France to fortify any place in Newfoundland or to erect any buildings there, besides stages made of boards and huts necessary and useful for drying of fish, or to resort to the island beyond the time necessary for fishing and drying of fish. But it shall be allowed to the subjects of France to catch fish and to dry them on land, in that part only. The boundaries were first given between Cape Bonavista and Point Riche on the west coast, afterward altered to the last limits between Cape John and Cape Ray. By the Treaty of Paris (1763) Saint Pierre and Miquelon were given to France. By the Treaty of Versailles (1783) the last boundaries were settled, and there was a secret declaration made by George III. that the English were not to interrupt the French fishery by their competition. It was this last underhand clause, not made public in the Treaty, which has given rise to so much contention. The English government always claimed that it was a concurrent fishery. The French, and with right, argued that under this declaration their rights were exclusive—the French contention would have been unanswerable if they had been able to occupy the whole coast line, but, as a matter of fact, their business was solely confined to about a dozen stations. They encouraged English fishermen to settle near their establishments to take care of their property during their absence. As the French business on the coast declined the native settlers increased until they numbered 17,000, compared with the 300 Frenchmen. Difficulties and disputes between the rivals were constantly arising, and but for the tact and good management of the naval officers of both countries would have become acute. The highest authority on English foreign politics, Sir Charles Dilke, and Admiral Revilliere of the French navy declared it was "the most dangerous question between England and France." Carrying on this transatlantic fishery in rivalry with opponents who lived on the coast was utterly hopeless to the French. They were hampered with the burden of carrying on a business 2,000 miles from their base of supplies. Every season they had to bring out their men and gear from France, and in October to carry them all back again. No bounties could support such a hopeless undertaking. Up to the beginning of the last century the French carried on an immense business in Newfoundland as well as their Bank fishery from Saint Pierre, but gradually the Shore fishery declined until of late years it has come down to a dozen old brigs and about 300 men from France. Although bounty was piled on bounty and millions of francs were spent by the home government in trying to keep the business alive it went down and down. For a time after 1890 when by a "modus vivendi" the French were allowed to erect lobster factories, an added impetus was given to the industry. At that time 7,000 cases of lobsters, at \$11 and \$12 a case, were really worth more than their whole catch of cod. Eventually the lobsters became fished out. Since 1842, 20 commissions have sat upon the question, but no agreement could be arrived at. When the Anglo-French Convention was eventually agreed on, the most difficult subject of all was the French shore dispute,

but the great French Minister Delcassé rose to the occasion and made the nation actually believe that, although England was giving France a free hand in Morocco, territory in Africa, and valued gifts elsewhere, French fishery rights in Newfoundland still remained intact. As a matter of fact the old treaties have been annulled. All the French fishermen have been paid more than 10 times the value of their premises, boats, gear, etc., \$275,000, and since the agreement in 1904, and the arbitration about values, not a solitary Frenchman has ever returned to the French shore.

The French banking catch is about 419,748 lbs. In 1896 it was 734,124. The total catch of cod on the Treaty shore was last about 10,000 lbs., and of lobsters about 3,000 cases.

D. W. PROWSE,

*Author of 'The History of Newfoundland from the Records.'*

**Newfoundland Dog**, a large, handsome, long-haired, water-loving dog, originating in Newfoundland, probably from a cross between the native Indian sledge-dog and early imported European dogs, especially the pointer. The breed showed extraordinary retrieving powers, and was sent to Europe in so large numbers, and at so high prices, that it long ago became almost extinct in Newfoundland. It has, however, been maintained pure by various breeding kennels both in Great Britain and the United States. The Newfoundland is massive in appearance, the average weight for dogs being 100 pounds and for bitches 85 pounds. The head is broad and massive with flat skull and somewhat square muzzle and the ears are small and lie close to the head. The fore legs are straight and the hind legs capable of powerful action and the tail is carried gaily but not curled over. The hair is straight and very thick and in color is black, black and white, or bronze. For standard of points see Dog.

**Newgate Prison.**—At first marking the "New Gate" of the city of London, as far back as the beginning of the 12th Century, "New Gate" became Newgate prison and earned for itself a most unenviable reputation, which steadily grew worse throughout its career of nearly 700 years. The great fire of 1666 partially destroyed it. It was then renovated, to be reconstructed a century later. As late as 1850 prisoners were kept in herds like cattle, and no cleaner. Proper sanitation or even decent ventilation was unknown in Newgate even up to the date of its demolition in 1902 and no attempt at all was made to separate the sexes of the prisoners until the early part of the 19th century.

Prisoners arrested by the King's warrant were the first inhabitants of Newgate. Then came Jew child-murderers and debtors. Thieves and other criminals were in due course locked up there. If they could pay, they could secure luxuries. If they were poor, they had to beg even for food. Prisoners were tortured at Newgate in the days of religious persecution. Many of them stayed there for years and died there without ever having their cases heard in any court. Condemned criminals, during several reigns, were sent to Newgate, where Dick Turpin was incarcerated and others of his enterprising contemporaries.

## NEWHALL—NEWMAN

**Newhall, nū'hāl, Charles Stedman**, American author: b. Boston, Mass., 4 Oct. 1842. He was graduated at Amherst in 1866 after serving in the Civil War and studied theology. He officiated as a clergyman for a time and later as a college professor, but became United States assistant special forest agent and is now (1907) superintendent of the forest reserves of northern and central California. He has written: 'History of Fall River' (1862); 'Ruthie's Story' (1888); 'Vines of Northeastern America' (1897); 'Fire and the U. S. Reserves' (1902); 'Joe and the Howards' (1869); 'Harry's Trip to the Orient' (1885); 'Trees of Northeastern America' (1890); 'Shrubs of Northeastern America' (1893); 'Sheep and the U. S. Reserves' (1901); 'Sunset, Lumbering and the U. S. Reserves' (1905); etc.

**Newman, nū'man, Albert Henry**, American Baptist clergyman and educator: b. Edgefield County, S. C., 25 Aug. 1852. He was graduated from Mercer University, Ga., in 1871, and from the Rochester Theological Seminary in 1875. He became a college professor, and in 1881-1901 filled the chair of church history at McMaster University, Toronto, Ont., and since 1901 has held a professorship at Baylor University, Waco, Texas. He has written: 'The Baptist Churches in the United States' (1894); 'A Century of Baptist Achievement' (1901); 'Manual of Church History' (1900-3); etc. He also translated and edited Imme's 'Hermeneutics of the New Testament' (1877).

**Newman, Francis**, English colonial governor in America: b. England about 1600; d. New Haven, Conn., 16 Nov. 1660. He emigrated to New Hampshire in 1638, settled later in New Haven and was one of the committee which waited upon Peter Stuyvesant to adjust the boundary question. In 1658 he became governor of the New Haven Colony, which office he held until his death.

**Newman, Francis William**, English scholar: b. London 27 June 1805; d. Weston-super-Mare, Somerset, 4 Oct. 1897. He was graduated from Worcester College, Oxford, in 1826; was fellow of Balliol in 1826-30; became professor of classical literature in Manchester New College in 1840; was professor of Latin at University College, London, in 1846-69, and was made principal of University Hall, London, in 1848. A brother of Cardinal Newman (q.v.), the thought and faith of the two wholly diverged. Francis made important contributions to the religious ideas of his time. His 'Phases of Faith' (1850), an autobiographical narrative of his religious changes, excited much controversy and was undoubtedly his best known writing; but 'The Soul: Its Sorrows and Aspirations' (1849) shows him at his best. In 1876 he joined the British and Foreign Unitarian Association, of which he became vice-president in 1879. His further writings are varied, treating of education, politics, religion, and social questions. An interesting experiment was his 'Hiawatha Translated into Latin' (1862).

**Newman, Henry Roderick**, American painter: b. New York 1833. He was intended

for a physician, but abandoned medicine for art in his 18th year. Going to France in 1870 he made a tour of Switzerland and proceeded to Venice (1871), but eventually settled in Florence. He is pre-eminently a water color painter and his works consist principally of landscapes, and architectural views, among which may be mentioned 'Venice'; 'Tuscan Spring'; 'The Cathedral at Florence'; 'An Architectural Study.' He has also produced some clever flower and fruit pieces, including: 'A Study of Pink and White Oleanders'; 'Grapes and Olives'; and 'Flowers.'

**Newman, John Henry**, English author, theologian, preacher, and Cardinal in the Roman Catholic Church: b. London, England, 21 Feb. 1801; d. Edgbaston Oratory, Birmingham, England, 11 Aug. 1890. Newman was the eldest of six children of John Newman, a London banker, from whose family Newman inherited the taste for music which distinguished him. The family was of Dutch Jewish origin and had come to England in the latter part of the 17th century. Newman's mother, Jemima Fourdrinier, was of French Huguenot origin. From her he received a religious training of Calvinistic tendency, and was early brought up with a thorough knowledge of the Bible, which it is said he almost knew by heart. Newman, who was a precocious boy and wrote much verse and prose, describes himself in the 'Apologia' as an imaginative and superstitious child. From the writers who most influenced him in his youth—particularly Law and Thomas Scott—he obtained two important beliefs that clung to him through life, the idea of eternal punishment and a belief in the necessity of dogma. When about sixteen he became convinced that it was the will of God that he lead a single life.

Newman entered Trinity College, Oxford, in his 16th year, took his degree in 1820, and was elected a fellow of Oriel in 1822. Here he came under several distinct influences, which had a good deal of effect on his career. From Bishop Butler's 'Analogy,' which he read about this time, he gleaned the principles, which ever after characterized his work and on which he wrote much, that revealed religion as manifested in outward institutions is the symbol of the natural religion underlying—an idea that was in accord with his boyish dreams—and that 'probability is the guide of life.' The strong personal influences were Dr. Hawkins, Provost of Oriel, to whose teaching Newman says he owed the habit of caution in statement and the weighing of words, and, among other doctrines, that of the value of tradition; Dr. Whately, who for a time somewhat arrested Newman's spiritual growth and developed his reasoning power, and his intimate friends, John Keble and Hurrell Froude, spiritual enthusiasts and haters of liberalism. His studies for 'The Arians of the Fourth Century' (pub. 1833) which he began at Oriel, tended to confirm his belief that 'Antiquity was the true exponent of the doctrines of Christianity and the basis of the Church of England,' and stimulated his innate belief in the existence of spirits, good and evil, which he regarded as the causes of physical phenomena. These studies also undoubtedly

laid the foundation for the course of reasoning which subsequently led him into the Church of Rome. Meanwhile, his progress in his profession had been rapid. In 1824 he took orders and was ordained curate of Saint Clement's Church, Oxford. The following year he became vice-principal of Alban Hall under Dr. Whately, a position which he gave up in 1826 to become tutor in Oriel. In 1828 he was made vicar of Saint Mary's, his only permanent position while a member of the Anglican Church; for in 1829 he broke with Whately because of his dislike for the tendency of the latter toward liberalism, and a year or two later retired from his tutorship at Oriel, for the reason that Dr. Hawkins, who then came into power, looked upon him and his friends, Keble and Froude, as too extreme in their views regarding the need of conformity to a more rigid order of things.

Through this period, Newman was gradually becoming alive to the conviction that he had a special mission to perform, and further stimulus was added by the French revolution of 1830 and the struggle in England which culminated in the Reform Bill of 1832. These tendencies toward liberalism he viewed with growing distrust. Not, however, till the close of his voyage with Froude to the south of Europe in the winter and spring of 1832-33 (during which he wrote many poems, including 'Lead Kindly Light') did the conviction become urgent. Taken so very ill in Sicily on his return voyage that his servant despaired of his life, he was nevertheless convinced that he should not die; he kept saying to himself "We have work to do in England." Hurrying thither as soon as his health permitted, he and his friends at once started the Oxford Movement (q.v.).

The object of this movement was in general the upholding of the ideal of primitive Christianity against the assaults of liberalism. It was pursued with great earnestness by Newman and his friends, Froude, Keble, Pusey, Rose, and others, and the means were the 'Tracts for the Times,' of which Newman was chief editor and author. He speaks of himself as occupying a modest position, but he was in reality the head of the movement. He himself held confidently to three principles which he endeavored to inculcate: the necessity of dogma in combatting liberalism; the existence of a visible church, "with sacraments and rites which are the channels of invisible grace"; and the belief that the Roman Catholic Church and the Pope were evil and anti-Christian. The first two of these beliefs he retained till the end of his life; it was in regard to the last that his views were completely altered and upon that belief his subsequent history turned. For Newman the Tractarian movement had two phases: up to 1839, he wrote in the spirit of full conviction and confidence; from then till the publication of the famous Tract 90 in 1841 there was a growing consciousness of the unsoundness of the arguments that he had been using against Catholicism. The chief task in the first period was the definition of the so-called "Via Media" in which the Tractarians tried to establish the true position of the church between Romanism and Liberalism, to construct, in New-

man's words, "a possible road between a mountain and a morass, to be driven through formidable obstacles, if it is to exist, by the boldness and skill of the engineers." The principal book in which the doctrine is expounded is 'The Prophetic Office of the Church Viewed Relatively to Romanism and to Popular Protestantism' (1837). By 1839 the soundness of his position seemed to be established, but his studies had unconsciously to himself laid the train for the overthrow of what he had been advocating, and these doubts took shape the next two years. The argument from Antiquity with which he had supported the *Via Media*, turned out to be an equally good argument for the Catholic Church. He also made the discovery that there had in church history been *via medias* before; the various early sects of heretics had in his new view occupied much the same position as the Anglican Church. He was touched by the fact that the early fathers whom he invoked in support of his effort at true compromise would inevitably, if alive, have sided with Rome, and his imagination—always a strong influence in his reasoning—was haunted by the words, "Securus judicat orbis terrarum," which seemed to make nugatory all schism. The result was that he grew far less hostile to the Catholic Church, and with Tract 90 the movement against it came to an end. The main point of that tract was that the Thirty-nine Articles of the Anglican Church had originally been framed for political rather than religious purposes: they were designed to allow good Catholics to become members of the Anglican Church with mere loss of their allegiance to the Pope. If that was the case, then the Anglican had no better doctrinal support than the Roman Church.

From that time Newman regarded himself as practically dead to Anglicanism. In the storm of indignation which the tract evoked he did not, however, immediately retreat. Preferring to think the matter over carefully, he kept his living at Saint Mary's till 1843, and in that same year retracted the many hard things he had said about Rome. Two years later, in October, he entered the Roman Catholic Church, and early in 1846 left Oxford for good. After over a year in Rome (1846-47), he founded the Oratory of Saint Philip Neri, at Edgbaston, Birmingham, where he remained until his death.

Though condemned as an apostate by common Anglican consent, and though living a very secluded life, Newman almost at once benefited by the change. Not only did he feel the peace of security, but his literary genius is said to have ripened wonderfully. Heretofore he had written somewhat tentatively, as one groping; now he expressed himself with sureness and an unwonted command of expression. His writings during the first 18 years after his conversion, nearly all in support of Catholicism, include such various types as his 'Discourses Addressed to Mixed Congregations' (1849); 'Lectures on Anglican Difficulties' (1850), and 'Lectures on Catholicism in England' (1851); various of the essays collected in 'Historical Studies'; two novels 'Loss and Gain' (1848) and 'Callista' (1855); and what is in many respects his masterpiece of treatment, 'The Idea of a University,' a series of discourses

which he delivered at Dublin in 1852 on the founding of the Roman Catholic University.

In 1864 occurred the controversy with Kingsley, which marks an epoch in Newman's life and in the position of the Catholics in England. Kingsley had said that the Roman clergy had little regard for truth, and had cited Newman as an advocate of cunning. Newman naturally asked for his evidence. Kingsley, in *Macmillan's Magazine*, where his first article had appeared, replied that he had mistaken Newman's tone, and apologized. Newman, reasonably dissatisfied with Kingsley's failure to produce the specific evidence, published the whole correspondence. Kingsley thereupon replied in a vigorous pamphlet entitled "What, then, Does Dr. Newman Mean?" in which he charged Newman with equivocation and cited all the instances he could find in Newman's life and works to prove his point. The merits of the controversy are as yet unsettled, though now of only historical interest; views would probably still range from extreme support of Newman to such words as those of Huxley, "That man is the slipperiest sophist I have ever met with. Kingsley was entirely right about him." ('*Letters*,' II., p. 240.) The effect of the controversy was the publication by Newman of the '*Apologia pro Vita Sua*.' This, which appeared serially between 21 April and 2 June, gave the key to Newman's life as an internal state.

The effect of the '*Apologia*' was to temper in a great measure the feeling between the Catholics and the Anglicans, and it gave Newman the honorable position of peacemaker. From that time on he occupied a high place in England and received many dignities. In 1877 he was elected honorary fellow of Trinity College, Oxford, and two years later was created cardinal by Pope Leo XIII. Two works are to be especially noted, '*An Essay in Aid of a Grammar of Assent*' (1870), in which Newman attempted to expound systematically the logic of belief aside from exact proof; and '*The Dream of Gerontius*,' written shortly after the '*Apologia*,' in which he delineated in poetical form the yearning of a soul toward certitude and truth.

These three books indicate where the place and power of Newman lie. His position is probably to be determined not by his intellectual contributions but by his personality which is of a high, noble, and persuasive type, and which is expressed in a style of unsurpassed skill and delicacy. As a contributor of ideas and new truth, he is not so important. As a theologian, his life-long beliefs and teaching—that the world is controlled by the powers of darkness, that God is the only holy thing, that the Church is the only true revealer of God—in no wise differ from good Catholic opinion. The great argument on which he ultimately based all his claims, that of probability, that we act not from certainty but from states of certitude, that personality which can induce states of certitude is a better guide than strict reason—the basis of this he got from Bishop Butler, nor did he take into consideration the fact that his argument would allow anybody to believe anything at all, provided he could summon enough certitude in support of it. Doubtless the mass do use just such sanctions, and Newman has certainly, both in life

and in work, put the argument as well as it has ever been put, but the method is wholly opposed to scientific proof, and it is easy therein to see the reason for the view of such men as Huxley. The truth of the matter probably is that Newman, with all his training in logic, really had little regard for strict evidence; his course during the Oxford movement shows that he argued from predispositions and predilections, and his conversion was in part at least the result of evidence supplied solely by his imagination. But as a gracious and winning personality his place is of the highest, as is his power of expression.

**Bibliography.**—The chief sources of information are, among Newman's many works, the '*Apologia*,' and '*The Letters and Correspondence of J. H. Newman*,' edited by his sister, Mrs. Anne Mozley. Lives and studies are those of H. J. Jennings ('*Cardinal Newman, The Story of His Life*'); R. H. Hutton ('*Cardinal Newman*'); William Barry (in '*Literary Lives*'), but a good life in English is still a desideratum, for the simple reason that biographers are almost always slightly partisan, and because materials for a complete study are scattered in various books as Church's '*The Oxford Movement*,' Mark Pattison's '*Memoirs*,' Abbott's '*Philomythus*,' and a score of others (see a long list in the '*Dictionary of National Biography*'). There is an excellent short study of the conversion and the theology of Newman by R. M. Lovett (*Harvard Monthly*, Dec. 1892, Jan. 1893).

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**Newman, John Philip**, American Methodist bishop: b. New York 1 Sept. 1836; d. Saratoga, N. Y., 5 July 1899. He studied for the ministry and in 1860 was ordained. He preached in New Orleans in 1864-9; in 1869-72 and in 1875-8 was pastor of the Metropolitan Methodist Church in Washington, D. C., and was chaplain of the Senate for three sessions. He was appointed by President Grant inspector of United States consulates in Asia in 1873, and in 1888 was elected bishop. He wrote: '*From Dan to Beersheba*' (1864); '*The Thrones and Palaces of Babylon and Nineveh from the Persian Gulf to the Mediterranean*' (1876); '*Christianity Triumphant*' (1884); '*Evenings with the Prophets on the Lost Empires*' (1887); '*The Supremacy of the Law*' (1890); '*Conversations with Christ*' (1901).

**Newnan, nū'nan**, Ga., city, county-seat of Coweta County; on the Central of Georgia and the Atlanta & W. P. R.R.'s; about 38 miles south by west of Atlanta. It is in a productive agricultural region in which cotton and fruits are extensively cultivated. The principal industrial establishments are cotton mills, cottonseed-oil mills, machine shops, flour mill, tannery, fertilizer works, a large plant for manufacturing boilers, engines, presses, and mill machinery, and an ice factory. The city owns the waterworks. Pop. (1910) 5,548.

**Newnes, nūnz**, Sir George, English journalist: b. England 13 March 1851; d. London, 9 June 1910. He was educated in London and entered journalism. He was owner of the



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*Westminster Gazette* and founder of "George Newnes, Limited," publishers, and proprietors of 'Strand Magazine,' 'Tid-Bits,' etc. He was knighted in 1895, and in 1900 became a member of Parliament for Swansea Town.

**Newnham** (nūn'am) College, England, an institution for the higher education of women at Cambridge, founded in 1871, and incorporated in 1880. No students are admitted under 18 years of age; the course of study corresponds with that of Cambridge University. There are a number of exhibitions and scholarships connected with the college, which is on the same lines as Girton (q.v.). The faculty numbers about fifteen, and there is an average attendance of over 160 students.

**Newpore, Fort**, a former Revolutionary fortification on Ward Creek, near Oneida Lake, New York.

**Newport**, nū'pōrt, **Christopher**, English sea captain: b. about 1565; d. 1618. In 1592 he commanded a ship in the West Indian expedition; sailed to Virginia in 1606, 1607 and 1609; was wrecked on the Bermudas in the latter voyage, but made his way to Virginia after many adventures recounted by Jourdain in the 'Discovery of the Bermudas,' which Shakespeare may have used in writing the 'Tempest'; and in 1612 entered the employ of the East India Company, for whom he made several very successful voyages.

**Newport, George**, English naturalist: b. Canterbury, England, 4 July 1803; d. London, England, 7 April 1854. He was educated at the London University and became a surgeon, but devoted much time to entomology, in which science he made valuable discoveries. He wrote: 'Observations on the Anatomy, Habits, and Economy of *Athalia Centifolia*' (1830); 'Catalogue of the Myriapoda in the British Museum' (1856); etc.

**Newport**, England, a town of Monmouthshire, on the Usk, 145 miles by rail west of London. It is an important river port communicating with the Bristol Channel. As one of the principal outlets for the produce of extensive collieries and iron and steel works in the vicinity, it has extensive dock accommodation covering over 80 acres. Its public buildings are all of modern erection, and include town hall, market hall, county offices, public baths, museum, and art gallery. Its most ancient buildings are the remains of a 12th century castle and the church of Saint Woollos.

**Newport, Ky.**, city in Campbell County; at the confluence of the Ohio and Licking rivers; and on the Louisville & N. and the Chesapeake & O. R.R.'s. Cincinnati, on the Ohio, and Covington, on the Licking, are opposite Newport. The city was settled in 1791; in 1795 was incorporated, and, in 1850, was granted a city charter. It is a popular residential city for Cincinnati business men. It is in an agricultural region and farm products are among its most important shipments. The chief manufacturing establishments are cigar-box factory, cast and sheet iron works, carriage works, watch-case factory, and a furniture factory. It has large coal and brick yards and considerable river trade. Fort Thomas, a government military post, is on an elevation near the city. Some of the prominent buildings are the city-hall, court-

house, post-office, the banks, a Masonic Temple, the churches and schools, and the library. It is the seat of Mount Saint Martin's and Immaculate academies, and it has good public and parish schools and a public library. The city now has commission government. It was formerly under the charter of 1894, which provided for a mayor who held office for four years, and a council. The mayor appointed the police and firemen and the members of the water commission, and, subject to the approval of the aldermen, the superintendent of public works and the city auditor. The council elected the bridge commissioners. The board of education is elected by the people, and the members hold office two years. The waterworks is owned and operated by the municipality. Pop. (1910) 30,309.

**Newport, N. H.**, town, county-seat of Sullivan County; on the Sugar River, and on the Boston & Maine railroad; about 35 miles in direct line northwest of Concord and 45 miles northwest of Manchester. It is in an agricultural and grazing region, and the good water-power contributes to its industrial prosperity. Its chief manufactures are woolen goods, agricultural implements, shoes, lumber and lumber products, clothing, and dairy products. It has a public library which contains (1904) about 8,000 volumes. Its scenery and climate make it a favorite summer resort. The city owns and operates the waterworks. Pop. (1900) 3,126; (1910) 3,765. Consult: Wheeler, 'The History of Newport'

**Newport, R. I.**, city, port of entry, county-seat of Newport County; in Rhode Island, on Narragansett Bay, and on the New York, N. H. & H. R.R.; about 30 miles south of Providence. It has daily steamer communications with Providence, New York, Fall River, and other ports. It is a famous summer resort, and in the season its facilities for transportation are much increased. Its beautiful scenery, equable climate, ease of access by land and water from New York, Boston, and other large cities, make it a favorite watering place. Its occupancy by people of great wealth, who have built summer residences costing millions of dollars, has made it fashionable and exclusive. In 1639 Newport was settled by Roger Williams; and later Anne Hutchinson and other refugees, who for religious convictions had been expelled from Massachusetts by the Puritans, came to Newport. At first Newport was independent in government, but in 1644 Roger Williams obtained a patent from the British Parliament under which all the colonies in what is now the State of Rhode Island were united under the name of "The Incorporation of Providence Plantations in the Narragansett Bay in New England." The charter gave much dissatisfaction and in 1663 was changed to a charter that continued in force until 1843. (See DORA REBELLION.) A public school was established in Newport in 1840. From the beginning the place was a trading port of importance; its commerce was greater than that of New York in 1769-70. One of the first acts of resistance against Great Britain took place at Newport when the British sloop Liberty was destroyed here, while engaged in enforcing obnoxious smuggling laws. The British took possession of Newport 6 Dec. 1776, and held it for two years. The shipping of

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the place and the general trade were nearly destroyed during the Revolution. The British soldiers burned in all about 475 houses. In 1780 Rochambeau and his troops from France made Newport their headquarters. In 1784, the year after the Revolutionary War had closed, Newport was incorporated; but in 1786 it surrendered its charter, and was not re-incorporated for 77 years.

It is claimed by some historians that Newport, and other parts of the United States, were discovered by Northmen as early as the 11th century. The "Old Stone Mill" in Touro Park is pointed out as a relic of the days of the Northmen; but it is now generally believed that this mill was built in the 17th century. Newport was one of the capitals of the State until 1900. Bishop Berkeley lived in Newport from 1729 to 1732 and here wrote his ode on Western progress, and part of his 'Alciphron.' William Ellery Channing and Commodore M. C. Perry were born in Newport. Some of the historic places are the State House built in 1742; the city-hall built in 1763; Redwood library, 1748; Trinity Church (P. E.), 1725; the headquarters of the British Army (Sayer House), in 1780. One of the oldest newspapers in the United States still in existence, is the *Newport Mercury*, established by James Franklin in 1758. The oldest part of the city is around the harbor; the modern part, with its magnificent mansions, surrounded by well-kept lawns, is toward the ocean. Overlooking and guarding the harbor are Fort Greble and Fort Adam. Some of the attractions other than those mentioned are the long beaches, the bathing places, the "Hanging Rocks," the 12-mile Ocean Drive, Purgatory (a rocky fissure 50 feet in depth), the Cliff Walk, and the Spouting Rock (when the water is disturbed by a storm it is forced through an opening in this rock). It has a United States torpedo station on Goat Island, and a United States Naval Training Station and War College on Coaster Harbor, also a naval hospital (1897). The city has many parks, fountains, and monuments which are works of art. It is the seat of Saint George's and Cloyne House schools and Saint Mary's Academy. A valuable collection of relics are in the Newport Historical Society building; there are several libraries, the People's, Redwood, and others.

It still has a large fish trade, but the city is now known for its society life, and its industries and commerce are of little value. Pop. (1900), 22,034; (1910) 27,149. Consult: Brooks, 'The Controversy Touching the Stone Mill'; Greene, 'The Providence Plantation'; 'Newport in the Revolution,' an article in the 'New England Magazine.'

**Newport, Vt.**, village, county-seat of Orleans County; on Lake Memphremagog, and on the Boston & Maine and the Canadian Pacific R.R.'s; about 50 miles in direct line north by east of Montpelier. In the summer season it has regular steamer communication with all the villages and towns on the lake. It is a favorite summer resort on account of its climate, the scenery in the vicinity and the opportunities for fishing. Its trade is chiefly in farm products; its manufactures are principally to supply local wants. It has fine church and school buildings and the Goodrich Memorial Library which con-

tains (1904) about 7,000 volumes. Pop. (1890) 1,730; (1900) 1874; (1910) 2,548.

**Newport News, Va.**, city and port of entry in Warwick County, on the James River and Hampton Roads, and at the terminus of the Chesapeake & Ohio railroad; situated 70 miles southeast of Richmond and 14 miles north of Norfolk. The city lies in the centre of a rich vegetable and fruit country. It is connected with Hampton and Old Point Comfort by electric railways. In the heart of the city facing the James River is Casino Park, which has become a popular resort.

**Trade and Commerce.**—With several foreign and coast lines of steamships sailing hence, and with a fine harbor and excellent shipping facilities, Newport News has very recently become an important port and the centre of large commercial interests. The foreign trade in 1901 amounted to \$36,658,000; the exports amounting to \$32,568,000. The foreign commerce of the port is largely carried on by the Chesapeake & Ohio Railroad and the United States Shipping Company, making direct connection with England and the continent. The city has become fourth in the United States in the shipment of grain. There are two national banks, each with a capital of \$100,000; six private banks, and several trust companies. The city has three weekly and four daily newspapers.

**Manufactures.**—Here is an extensive ship-building plant, giving employment to 7,000 workmen; two dry docks 600 and 900 feet long; two grain elevators with a capacity of 2,850,000 bushels; wood-working mills; ice factories, lumber mills, iron works, shoe factory, shirt factory, and brewery.

**Government.**—Newport News is governed, under its original charter of 1896, by a mayor, elected every four years, a common council, consisting of 16 members, and a board of eight aldermen. The city has an improved system of waterworks and electric light and gas plants.

**Population.**—Newport News is a young town practically lacking in history. It was first laid out in 1882 and incorporated in 1896. Its growth has been very rapid; the population in 1890 was 4,449; in 1900 it was 19,500, and 1910 20,205.

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**News-Letter**, a popular name applied to the printed sheets or letters issued weekly in the early part of the 17th century, the news for which was collected in the coffee houses. Originally they were literally letters of news written by professional newswriters, and sent by them to their employers weekly. Many early printed newspapers took *News-Letter* as a title, as the 'Boston Newsletter,' etc.

**Newspaper**, a daily or other printed paper containing news or intelligence of past, current, or coming events, together with comment, criticism, or discussion of such events by editors and contributors. The total number of newspapers published in the world at present is estimated at about 60,000, distributed as follows: United States and Canada, 26,360; Germany, 8,000; Great Britain, 8,000; France, 4,300; Japan, 2,000; Italy, 1,500; Austria-Hungary, 1,200; Asia (exclusive of Japan), 1,000; Spain, 850; Russia, 800; Australia, 1,000; Greece, 600; Switzerland, 450; Holland, 300; Belgium, 300;

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all others, 1,000. Of these more than half are printed in the English language. A detailed history of the newspaper in America will be found under AMERICAN NEWSPAPERS.

**Early Roman Bulletins.**—The newspaper had its origin several centuries before the Christian era. The Romans published The 'Acta Diurna', the 'Acta Publica', the 'Acta Senatus' and other journals. The 'Acta Diurna' was a bulletin in which accounts were given of the progress of the imperial arms. The intelligence was communicated by the generals who received it from the officers under their command, and thus the contents became known throughout the army. The 'Acta Diurna', however, recorded other than military matters, such as trials, punishments, deaths, and sacrifices. The 'Acta Senatus' contained accounts of the various matters brought before the senate, the opinions of the chief speakers, and the decisions of the house, published regularly by command of Julius Cæsar, as part of the government gazette. The 'Acta Publica' was a still nearer approach to the true newspaper form. During the later times of the republic, and under the empire, it was published daily at Rome by the authority of the government. It contained a register of the births and deaths in the city; an account of the money paid into the treasury, from the provinces, and everything relating to the supply of corn, and a kind of court circular, containing an account of the births, deaths, festivals, and movements of the imperial family. Such details of public affairs as it was deemed expedient to publish were also included in it. The speeches in the senate and the public assemblies were taken down by the early Roman short-hand writers called *actuarii*. These, assisted by clerks and notaries, drew up the 'Acta,' under the superintendence of censors, quaestors, and other magistrates. The publication consisted in posting them in some public place, that any one who pleased might read them.

**First Printed Journals.**—The *Peking Gazette* was probably the first printed newspaper, and is the oldest daily journal in the world. It was first issued about 1340 A.D. The *Gazette* is still in existence, and is an official journal, forming a pamphlet of 20 to 40 pages of coarse paper, printed from wooden types on one side only, and having a colored paper cover. Toward the close of the 15th century, soon after the invention of printing, small sheets, usually in the epistolary form, appeared in Augsburg, Vienna, Ratisbon, and Nuremberg. They were called 'Relationen' and the 'Neue Zeytung', and gave accounts of the discovery of America and of other important public events, and like modern newspapers they chronicled the more interesting and startling local incidents. The 'Notizie Scritte', published monthly in Venice, in 1562, is said to have been the first Italian newspaper. Its price was a small coin called gazetta; hence the word gazette which came to be the popular name for the modern newspaper. The war which Venice waged in Dalmatia gave rise in 1563 to the custom in Venice of having military and commercial information read at a particular place by those desirous to learn the news, who paid for this privilege. A file of these Venetian papers, covering a period of 60 years, is still

preserved in the Magliabecchi Library at Florence.

**English Newspapers.**—A printed bulletin entitled 'Relations' was published in England as early as 1462, and in 1527 there was one called 'New Tidings', but neither of these presented more than a single piece of intelligence. A pamphlet called 'The Newes from Spaine' made its appearance in the reign of Queen Elizabeth in order to convey to the people the tidings of the approaching armada from Spain, and the various counter-movements on the part of the British army and fleet. A more pretentious journal was issued in 1622, under the title, 'The Weekly News from Italy, Germany, etc.,' published by Nathaniel Butter, Nicholas Bourne, and Thomas Archer, and this may be regarded as the first specimen of the regular newspaper in England. Numerous other news journals followed, but it was not till the beginning of the parliamentary wars that the newspaper first acquired political influence. One of these, published in November 1641, under the title of 'Diurnal Occurrences, or the Heads of Several Proceedings in both Houses of Parliament,' is noticeable as the first which furnished a report of the proceedings in Parliament. The other papers which followed this were the 'English Post,' 'England's Memorable Accidents,' 'The Kingdom's Weekly Intelligencer,' 'The Spy,' 'The Parliament's Scout,' 'The London Post,' 'The Country Messenger,' and were most of them published weekly. In Cromwell's time the principal journals were the 'Mercurius Politicus' and the 'Public Intelligencer.' The publication of newspapers without license was prohibited in the reign of Charles II., and an office was created called Licensor of the Press. Advertisements first appeared in English newspapers in 1652. The first copy of the 'London Gazette' was issued 7 Nov. 1665, at Oxford, whither the court had retired in consequence of the plague then raging in London. It has since been uninterruptedly published twice a week as an official court circular. The first London daily paper was published in 1709 under the name of the *Daily Courant*. At this time appeared Defoe's journal, the 'Review.' The first number of the 'Tatler' was published on 23 April 1709, and of the 'Spectator' on 1 March 1711. Though not properly newspapers in the modern sense of the term, their early numbers contained general news in addition to their other literary matter. In 1712 a tax or stamp-duty was imposed by the government of a half-penny on papers of half a sheet or less, and a penny on papers of a single and above half a sheet. The *London Daily Advertiser* first appeared in 1726, and became afterward celebrated by the publication of the famous 'Letters of Junius.' The *Morning Chronicle* appeared in 1769, and the *Morning Post* in 1772. The *Times* was first commenced 18 Jan. 1785, under the name of the *London Daily Universal Register*, which was afterward superseded by that of the *Times* on 1 Jan. 1788. It was ably conducted from the first by Mr. Walter, who in 1803 transferred the management to his son. The *Daily News* appeared in 1846, the *Daily Telegraph* in 1855, and the *Daily Standard* in 1857. Others of later establishment are the *Echo*, *Graphic*, *Mail*, *Pall Mall Gazette*, *Westminster Gazette*, etc.

The provincial English press began with the *Norwich Postman*, published in 1706, and followed by the *Norwich Courant* in 1714, and the 'Weekly Mercury, or Protestant's Packet' (at Norwich) in 1720. The 'Worcester Postman' appeared in 1708, the *Newcastle Courant* in 1711, the *Kentish Post* in 1717, and the *Leeds Mercury* in 1718.

*Ireland and Scotland.*—The first newspaper published in Ireland was the *Dublin News-Letter*, in 1685, followed by the *Dublin Intelligencer* in 1690. The *Belfast News-Letter*, still flourishing, first appeared in 1737. The 'Freeman's Journal' commenced in 1763. In Scotland on 31 Dec. 1660, appeared at Edinburgh the first number of the 'Mercurius Caledonius,' which had an existence of only three months. The *Edinburgh Evening Courant* was started in 1718. The *Caledonian Mercury* commenced in 1720 and existed 150 years. The *Edinburgh Gazette* dates from 1699. The first paper published in Glasgow was the *Glasgow Courant*, on 11 Nov. 1715, followed by the *Glasgow Journal* in 1729. The *Edinburgh Scotsman* was first issued in 1817, and the *Glasgow Herald* in 1782.

*France.*—The first French newspaper, *The Gazette de France*, appeared in 1631, edited by Theophraste Renaudot, a physician, who had been in the habit for some time previously of presenting to his patients a printed account of the various occurrences of the day. The *Gazette* had a most successful career and existed until 24 Aug. 1848, when it was suspended. Two weeks later it was resumed under the title of *Le Peuple Français*, which title was again altered to *L'Étoile de la France*. The *Gazette Burlesque*, a newspaper in verse, was commenced in 1650, under the management of the poet Jean Loret. The *Mercurie Galant* was started by Donneau de Visé in 1672, and under the title of the *Mercurie de France*, to which it was changed in 1717, continued to exist until 1853. After the Revolution a host of new papers appeared. Among these were the *Chronique de Paris*, the *Orateur du Peuple*, Hebert's *Père Duchesne*, and *Ami du Peuple*. Of all the newspapers, however, commenced at this eventful period, the only ones which have survived are the *Journal des Débats* and the *Moniteur*. Under Napoleon the press was subjected to a rigid censorship, which was continued until 1819. During the reign of Louis Philippe appeared *La Presse* and *Le Siècle*, both of which commenced in 1836. Since that date the growth of the newspaper press in Paris has been rapid. In 1903 over 1,400 newspapers were regularly published in Paris alone, some 60 of these being daily political organs. The most important of all is the *Temps*, with politics of moderate republicanism. *Le Petit Journal*, a cheap popular journal, has a circulation of over 1,000,000 daily.

*Germany.*—Egenolf Emmel, sometimes called the father of journalism, established at Frankfurt in 1615 *Die Frankfurter Oberpostamtszeitung*. A second journal was commenced at Hildesheim in 1619, and a third at Herford in 1630. At the end of the 17th century there were at least 30 daily newspapers in Germany. The *Hamburgischer Correspondent* appeared in 1714 as a continuation of the *Holsteinische Zeitungs-correspondance*, established in 1712. It was the first German newspaper which received news

of foreign affairs from correspondents resident abroad. The *Allgemeine Zeitung* was published in 1798, and soon rose to the highest position in German journalism. Other important journals are the *Norddeutsche Allgemeine Zeitung*, the *National Zeitung*, the *Neue Preussische Zeitung*, the *Volks-Zeitung*, the *Vossische Zeitung*, the *Kölnische Zeitung*, etc.

*Russia.*—The first journal in Russia appeared in 1703, and was followed by several others during the first half of the 18th century. The press in Russia is under very strict supervision, and thus naturally has but little influence in public affairs. The *Journal de St. Petersburg*, in French, has a considerable circulation outside of Russia.

*Holland and Belgium.*—The pioneer newspaper of Holland was first published in 1656. The early Dutch newspapers were distinguished by the accuracy of the information furnished by them. It was not until 1830 that they began to comment on public occurrences, their criticism having been previously directed to items of commercial intelligence. The principal Dutch journals are the *Allgemeene Handelsblad* of Amsterdam, the *Haarlemsche Courant*, the *Journal de la Haye*, and *Staats-Courant*, the two latter published at The Hague. Among Belgian papers the *Indépendance Belge*, the *Journal de Bruxelles*, and the *Etoile Belge* are distinguished for the ability with which they are conducted.

*Australia.*—There are nearly 1,000 papers published in Australia. The daily issues are excellent imitations of the London newspapers. The *Sydney Gazette* was established in 1803.

*India.*—The first Indian newspaper in the English language appeared in Bengal in 1780. There are upward of 300 newspapers published in the various vernacular tongues.

In Turkey the first newspaper appeared in 1795 in French, and the first daily journal in Spain was published in 1704. The modern newspapers of Norway, Sweden, Denmark, Italy, South Africa, Switzerland, Portugal, Greece, China, Japan, and South and Central America, are of less importance than those of the other countries heretofore mentioned, being largely local in character.

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**Newstead** (nū'stēd) **Abbey**, England, on the border of Sherwood Forest, 10 miles northwest of Nottingham, was an Augustinian Canons institution founded in 1170 by Henry II. in atonement for Becket's murder. In 1540, after the dissolution, it was given to Sir John Byron the Little, and is celebrated in connection with Lord Byron, the poet, who made the semi-ruinous edifice his home in 1808, but sold it in 1818. The abbey has since been restored, and has many carefully preserved relics of the poet. Consult: Irving, 'Abbotstord and Newstead.'

**Newt**, a small tailed batrachian of the genus *Diemyctylus*, *Triton*, or a related genus, but sometimes considered to constitute a distinct family, under the name *Pleurodelidae*. Newts are sometimes also called elms or tritons, and the name is often applied erroneously to salamanders of other genera not closely related. Among technical characteristics of the newts in general are the bony carpus and tarsus, the bony ball-and-socket joints of the vertebræ, and the nar-

row bands of palatine teeth. The species are more strictly aquatic than most salamanders, and the males of most species undergo remarkable seasonal changes in the development of high dorsal crests, papillæ, or other appendages on the arms and elsewhere, and of brilliant colors. About 20 species belonging to this group of genera are known, of which more than half are European, several Asiatic, and only two North American, while none have been found elsewhere. The eastern American species (*Diemictylus viridescens*), of which a quite distinct variety occurs in Texas and Mexico, is abundant throughout the Eastern States, and extends into Canada. It may be distinguished by the rather narrow arched head marked with a pair of longitudinal keels, and the handsome greenish red color of the back, the pale yellow below, and the row of conspicuous scarlet, black-bordered spots on each side. In the adult stage just described this animal is about  $3\frac{1}{2}$  inches long and completely aquatic. A terrestrial form is somewhat smaller, lacks the dorsal crest altogether, has a rougher skin and a bright vermilion color. This is the pretty little creature common in eastern woods, which later returns to the water and assumes the greenish garb. Newts are chiefly nocturnal, and when abroad swim actively, not merely crawling on the bottom in the manner of most salamanders. They feed on all kinds of aquatic larvæ, worms, small mollusks, and crustaceans, and are very voracious. During the breeding season in the spring the male develops a broad cutaneous fin, richly provided with sense organs on the back and tail, and becomes otherwise modified. The fertilized eggs are deposited singly, each in a gelatinous capsule whose adhesive nature permits of their attachment to water-plants, some of the leaves of which are drawn about each egg. The larvæ are strictly aquatic and possess three pairs of external gills, but after metamorphosing, leave the water and assume the red terrestrial phase, when they live in the woods under stones and logs, appearing at night or during rain. This stage lasts for several years, when they seek the water either in the spring or fall and soon acquire the adult color and characteristics. Whether or not they can again enter the red phase by leaving the water is not certainly determined. Like frogs, newts swallow the skin after molting, which appears to take place most readily while the animal is immersed in water.

The Pacific newt (*Diemictylus torosus*) is nearly twice as large, and is further distinguished by the wide, flat, keelless head, and brown, unspotted color. It is very abundant in California, and ranges from the southern part of that State to Alaska. Its habits are essentially similar to those of the eastern species. It feeds on earthworms, snails, slugs, insects, and its own sloughed skin, eggs and young. In this species the eggs are deposited in clumps.

The numerous European species present many interesting differences in detail in habits, especially in the mode of reproduction. Some of them live habitually away from the water and migrate long distances to it in the spring, and one species is remarkable from the fact that the ribs penetrate the skin. All of the newts make very interesting and satisfactory aquarium pets.

J. PERCY MOORE,  
University of Pennsylvania.

**Newton, nū'ton, Alfred**, English ornithologist and zoologist: b. Geneva 11 June 1829; d. London 7 June 1907. He was educated at Magdalene College, Cambridge, of which he was traveling fellow 1854-63, fellow in 1877, and till his death professor of zoology and comparative anatomy. He took a prominent part in urging bird protection by legislation; traveled in Lapland, Iceland, West Indies, North America, and Spitzbergen; edited 'The Ibis' (1865-70) and the 'Zoological Record' (1870-2); contributed the ornithological articles in the 9th edition of the 'Encyclopædia Britannica'; and greatly advanced the study of the comparative anatomy of birds. He wrote 'The Zoology of Ancient Europe' (1862); 'Ootheca Woolleyana' (1864-1902); 'Zoology' (1894); and a 'Dictionary of Birds' (1893-6).

**Newton, Sir Charles Thomas**, English archaeologist: b. Bredwardine, Wales, 13 Sept. 1816; d. Westgate-on-Sea 28 Nov. 1894. He was educated at Shrewsbury School, and at Christ Church College, Oxford, and was assistant in the department of antiquities in the British Museum 1840-52. He became vice consul at Mytilene in 1852, and acting consul at Rhodes in 1854; discovered the tomb of Mausolus at Halicarnassus and the famous bronze serpent of Delphi at Constantinople; and after a year as consul at Rome in 1861 became keeper of Greek and Roman antiquities in the British Museum, being the first incumbent of this post and holding it until December 1885. During this term he furthered archaeological excavations in Ephesus, Priene, Smyrna, Sicily, Cyprus, Cyrene, and Rhodes, and procured for the British Museum the Farnese collection, the two Castellani collections, and those of Pourtales and Blacas. From 1880 to 1888, Newton (who was knighted in 1887) was professor of classical archaeology in University College, London; to his work there and in the British Museum is largely due the revival of English interest in classical antiquities. He wrote: 'Method of the Study of Ancient Art' (1850); 'History of Discoveries at Halicarnassus, Cnidus, and Branchidæ' (1862-3); 'Travels and Discoveries in the Levant' (1865); and 'Essays on Art and Archaeology' (1880).

**Newton, Gilbert Stuart**, English painter. b. Halifax, Nova Scotia, 2 Sept. 1795; d. Chelsea, England, 5 Aug. 1835. His mother was sister to Gilbert Stuart, the American portrait-painter, his father an officer in the British army, and he went eventually to England after visiting Italy and France (1817). After studying at the Royal Academy he exhibited regularly both in the Royal Academy and the British Institution from 1818 to 1833. He was elected Royal Academician in 1832. The last three years of his life he was confined in a private asylum for the insane. His pictures are mostly domestic scenes, are anecdotic in motif, and he especially excelled in the portrayal of feminine beauty of the English type. His best works include: 'The Gentle Shepherd'; 'The Dutch Girl' (both of which were engraved); 'Porceaugnac and the Doctors'; 'The English Girl'; 'Olivia's Return'; 'The Forsaken.'

**Newton, Henry Jotham**, American manufacturer and chemist, inventor of the dry-plate photographic process: b. Hartleton, Pa., 23 Feb. 1823; d. New York 23 Dec. 1895. At 20 he was.

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a partner in the firm of Wittlesey Brothers, piano-makers, Salem, Conn., whom he left six years later to form the New York firm Lighte and Newton; this new company greatly improved the manufacture of pianos. Newton was later connected with the Bradburys in the piano trade; in 1884 he became president of the Henry Bonnard Bronze Co. His invention of a permanent collodion emulsion and of the other details of the dry-plate process in photography dates from 1875. Educated a Presbyterian, Newton joined the Methodist Church, then the Unitarian, and finally allied himself with the Spiritualists. A society formed by him in 1875 for psychical research was, he claimed, the first Theosophical Society, from which Mme. Blavatsky and Henry S. Olcott took the ideas which they falsely proclaimed to be of Indian origin.

**Newton, Hubert Anson**, American astronomer and mathematician: b. Sherburne, N. Y., 19 March 1830; d. New Haven, Conn., 30 Aug. 1896. He was graduated at Yale in 1850, and in 1855 became professor of mathematics there. He spent one year in foreign study and for the rest of his life lived quietly in New Haven. He was far better known as an astronomer than as a mathematician, because of his remarkable researches as to meteors, and meteoroids, undertaken to verify Olmsted's hypothesis that meteors were the more visible portions of a great stream of bodies with a fixed orbit about the sun, and this hypothesis he proved correct by a brilliant and painstaking series of mathematical computations. He wrote on meteors for several encyclopædias, and published most of his original papers on that subject in the 'Memoirs' of the National Academy and in the 'American Journal of Science,' of which he was long editor. The National Academy awarded him the Smith gold medal for his work on meteors. Newton did much to introduce the study of the metric system into the public school curriculum; was an authority on the theory of transcendental curves; and wrote various tables for life insurance companies. He was a simple, genial, modest man, and deeply interested in the material advancement of Yale College.

**Newton, Sir Isaac**, English mathematician and natural philosopher: b. Woolsthorpe, Lincolnshire, 25 Dec. 1642; d. Kensington 20 March 1727. He was sent at an early age to the village school, and in 1654 to the free grammar school of Grantham. He was entered at Trinity College, Cambridge, in 1661. He had the good fortune to find in the celebrated Dr. Barrow, professor of Greek (1660-3) and from 1663 Lucasian professor of mathematics, an assistant in his mathematical studies. He appears to have found particular interest in Wallis' treatise, 'Arithmetica Infinitorum.' He was graduated in 1665. While absent from Cambridge in 1665-6, during the plague, he discovered the binomial theorem (q.v.) and the direct and inverse methods of fluxions' (q.v.) (that is, differential and integral calculus); computed the area of the hyperbola; and first turned his attention to the subject of gravity. The familiar story, first given by Voltaire, is that the fall of an apple led him to reflect on the nature of that remarkable principle which attracts bodies to the centre of the earth. He considered that if the moon was retained about the earth by terres-

trial gravity, the planets, which move round the sun, ought similarly to be retained in their orbits by their gravity toward that body. Having determined the law of the gravity of the planets toward the sun he endeavored to apply it to the moon, that is, to determine the velocity of her motion round the earth by means of her distance, as settled by astronomers, and of the intensity of gravity, as shown by the fall of bodies at the earth's surface. To make this calculation it was necessary to know exactly the distance from the surface to the centre of the earth; but unfortunately at that time there existed no correct measure of the earth's dimensions. Newton was obliged to employ the imperfect measures then in use, and found that they gave for the force which retains the moon in her orbit a value greater by one sixth than was allowed by observed facts. This small difference seemed to his cautious mind a strong proof against his bold conjecture. He imagined that some unknown cause modified, in the case of the moon, the general law of gravity indicated by the motion of the planets. Yet he did not abandon his leading notion, but determined to wait till study and reflection should reveal to him this supposed unknown cause. In 1667 he returned to Cambridge as fellow of Trinity, and in 1668 constructed a reflecting telescope. In the latter year Mercator published his 'Logarithmotechnia,' in which he had obtained the area of the hyperbola referred to its asymptotes by expanding its ordinate into an infinite series, which was the main secret of Newton's method. Barrow showed this work to Newton, who immediately gave him his own treatise, but did not yet publish.

In the course of 1666 his attention had been accidentally drawn to the phenomena of the refraction of light through prisms. His experiments led him to conclude that light, as it emanates from the radiating bodies, is not a simple and homogeneous substance, but that it is composed of a number of rays, endowed with unequal refrangibility and velocity and possessing different coloring properties. More than two years elapsed before he returned to his researches on this subject; but in 1669, having been appointed Lucasian professor of mathematics, and preparing to lecture on optics, he endeavored to mature his first results, and composed a complete treatise, in which the fundamental properties of light were unfolded, established, and arranged by means of experiments alone, without any mixture of hypothesis—a novelty at that time almost as surprising as these properties themselves.

In 1672 Newton was chosen a fellow of the Royal Society, to which he communicated a description of a new arrangement for reflecting telescopes, which rendered them more convenient by diminishing their length without weakening their magnifying powers, and soon after, the first part of his labors on the analysis of light, in which he advocated the material theory (that is, that light consists of small particles shot out by a luminous object), the society appointed three members to study it fully and report upon it. Hooke undertook to draw up the report. Instead of discussing the new facts as presented by the experiments of Newton, he examined them merely in relation to his own hypothesis—now known as the undulatory theory, and ac-



cepted as the true one — and concluded by allowing whatever appeared reconcilable with his own hypothesis, and by advising Newton not to seek any other explanation of the facts. Newton in reply adduced new experiments confirming his material (or corpuscular) theory and refuted the objections to the production of whiteness by the mixture of all the rays. He addressed another paper (1675) to the Royal Society, completing the account of his results and of his views on the nature of light. This treatise, united with his first paper on the analysis of light, afterward served as the base of the great work, 'Treatise on Optics' (1704), in which, however, the experimental investigation of the phenomena is more extensive and more strictly separated from all hypothesis. It is now known that Newton was wrong, and that light results from wave-motion in a pervading medium called ether. But Hooke's explanations were vague, and his theory remained untenable until the discovery, a century later, of the principle of interference (q.v.). In 1679 Newton had occasion to write to Hooke about a system of physical astronomy on which the Royal Society had asked his opinion. Hooke and Newton held conflicting opinions, and Newton, having examined by mathematical calculations a position maintained by Hooke, found that an attractive force, emanating from a centre, and acting inversely as the squares of the distances, would produce motions exactly resembling the planetary motions both in regard to the form of the orbit and the velocity of the body at each point. This was the secret of the system of the world; but it still remained to account for the discordance of the moon's motion, which had before (1665) embarrassed Newton. But in 1682 he learned the results of a new measurement of the arc of a meridian. Two years were spent in following up the consequences of this discovery, and preparing his immortal work 'Philosophiæ Naturalis Principia Mathematica'; but it was not till 1686 that he concluded to present his work to the society, and it was printed in 1687 at the personal expense of Halley, the secretary. Newton's teachings were introduced at Cambridge in 1699 and at Oxford in 1704, but were not admitted by the French scientists for half a century.

In 1687 Newton was one of the delegates sent by the University of Cambridge to maintain its rights before the High Commission court when they were attacked by James II., and in 1689 he was elected by the university to the convention parliament, but never distinguished himself in that body. He had always taken great interest in chemistry, and constructed a small laboratory for prosecuting his investigations, and seems, after the publication of the 'Principia,' to have devoted almost his whole time to them.

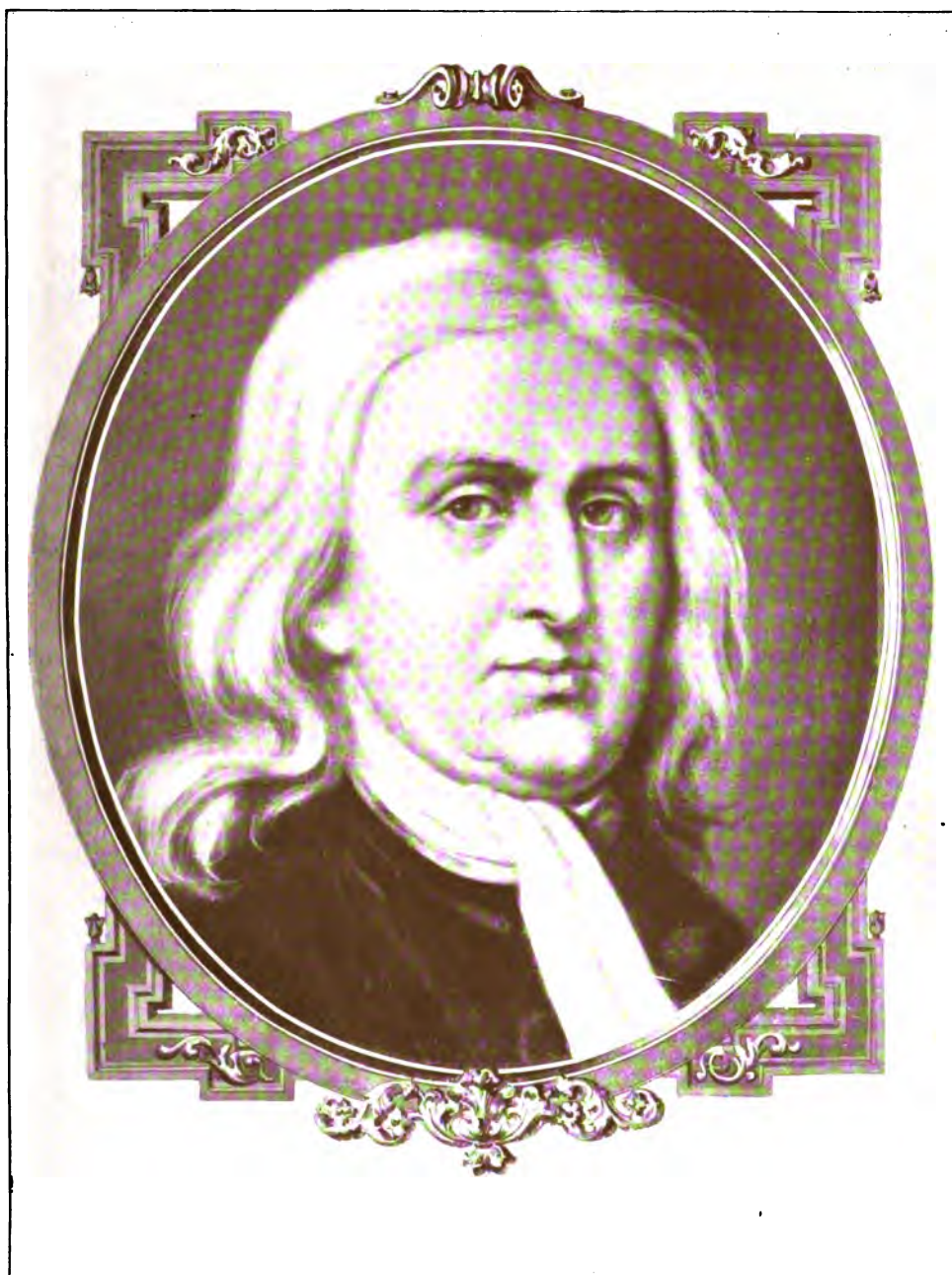
In 1696 he was appointed warden of the mint, a general recoinage having then been undertaken. In this office he rendered essential service, and in 1699 was made master of the mint. In 1701-2 he again sat in Parliament for his university; in 1703 he was chosen president of the Royal Society; and in 1705 was knighted by Queen Anne. In 1704 he gave to the world his 'Optics,' which contains all his researches on light. Later works were his 'Arithmetica Universalis' (1707; more complete 1712); 'Methodus Differentialis' (1711); and his 'Anal-

ysis per Equationes Numero Terminorum Infinitas' (1711); 'Chronology of Ancient Kingdoms Amended' (1728); and 'Observations on Daniel and the Apocalypse' (1733), an attempt to show the fulfilment of the prophecies. In 1705-12 he was involved in a controversy with Flamsteed; and in 1705-24 in one with Leibnitz as to priority in the discovery of fluxions. The splendid genius of Newton has often been testified to, among many by Macaulay, who declared that in no other person did the demonstrative and inductive faculties ever exist in such perfect co-ordination. His statue, by Roubiliac, stands in Trinity College, Cambridge. Horsley's edition of his works (1779-85), with the 'Opuscula,' collected by Castillon (1744), and his 'Letters,' inserted in the 'Biographia Britannica,' contain nearly all his printed works. Three editions of the 'Principia' were published in his own lifetime; the last reprinted at Glasgow in 1871 by Sir W. Thomson (Lord Kelvin) and Professor Blackburn. The standard 'Life of Newton' is that by Sir David Brewster, who had full access given him to the great mass of Newton's papers (1855; 2d ed. 1860).

**Newton, John**, English astronomer and mathematician: b. Oundle, Northamptonshire, England, 1622; d. Ross, Herefordshire, England, 25 Dec. 1678. He was graduated from Oxford University in 1642 and engaged in mathematical and astronomical work, remaining loyal to the king during the Protectorate. After the Restoration he was made king's chaplain in 1661 and became canon of Hereford in 1673. He wrote: 'Institutio Mathematica' (1654); 'Geometrical Trigonometry' (1659); 'Introduction to the Art of Logic' (1671); 'Cosmography' (1679); etc.

**Newton, John**, English clergyman: b. London 24 July 1725; d. there 21 Dec. 1807. He led a wandering life on the sea in 1736-55, but in 1748 underwent strong religious experiences, the effects of which were increased by the preaching of Wesley and Whitefield, and after a period of private study was ordained priest in the Church of England in 1764. From 1764 to 1780 he was curate of Olney, Buckinghamshire, and then became incumbent of Saint Mary Woolnoth, London, where he preached until the year of his death. His evangelical influence was very strong there, and he preached to large congregations. He is best known, however, for his connection with the poet Cowper, who settled at Olney in 1767, and who was kept occupied by the good man in an almost unintermitted round of religious exercises. Newton seems to have foreseen the outcome, and endeavored to provide congenial occupation for the poet in seeking from him contributions to the 'Olney Hymns.' Newton received his D.D. from the College of New Jersey (Princeton) in 1792. Among his publications are 'Review of Ecclesiastical History' (1770) and 'Cardiphonia' (1781). See COWPER.

**Newton, John**, American military engineer: b. Norfolk, Va., 24 Aug. 1823; d. New York 2 May 1895. He was graduated from West Point in 1842 and was appointed to the engineering corps. At the beginning of the Civil War he was chief engineer of the department of Pennsylvania and in September 1861 was made brigadier-general of volunteers. He served with



SIR ISAAC NEWTON.



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distinction through the war and in 1865 was promoted brigadier-general and major-general in the regular army. He was mustered out of the volunteer service in 1866 but continued in the regular army, and in 1884 was made chief of engineers. He engineered the removal of the obstructions at Hell Gate Channel in the East River, New York; was commissioner of public works in New York, and in 1886 was retired at his own request.

**Newton, Richard Heber**, American Protestant Episcopal clergyman: b. Philadelphia 31 Oct. 1840. He was son of the rector of Saint Paul's, Philadelphia, studied in the Philadelphia Divinity School, was assistant to his father (1860-2) and, after a short time in a church at Sharon Springs, N. Y., succeeded his father in Philadelphia, leaving this charge in 1869 to go to All Souls' Church, New York. In 1903 he was appointed preacher to Leland Stanford, Jr., University but soon resigned this position. He is a broad-churchman, and has several times been threatened with trial for heresy. He took a prominent part in the Congress of Religions held at Chicago in 1893 and is now vice-president of the organization of this congress. He wrote: 'The Morals of Trade' (1876); 'Womanhood' (1880); 'Philistinism' (1885); 'Social Studies' (1886); 'Church and Creed' (1891); and 'Christian Science' (1898).

**Newton, William Wilberforce**, American Episcopal clergyman: b. Philadelphia, Pa., 4 Nov. 1843. He was graduated from the University of Pennsylvania in 1865 and has held important rectorates in Newark, N. J., Boston, Mass., and Pittsfield, Mass. He has published: 'The Pilgrim Series of Sermons to Children'; 'A Run Through Russia'; 'The Child and the Bishop'; 'Summer Sermons from a Berkshire Pulpit'; etc.

**Newton, Ill.**, city, county-seat of Jasper County; on the Embarras River, and on the Peoria, D. & E., and the Illinois S. R.R.'s; about 100 miles in direct line southeast of Springfield. It is in a productive agricultural region, and in the vicinity of large coal fields. The chief manufactures are dairy products, flour, brick, tile, lumber products, and woolen goods. The city has considerable trade in farm and dairy products, fruit, coal, and its manufactures. Pop. (1910) 2,108.

**Newton, Iowa**, city, county-seat of Jasper County; on the Chicago, Rock Island & P. and the Iowa Central R. R.'s; about 30 miles in direct line east by north of Des Moines, the capital of the State. It is the commercial centre of a rich agricultural section in which considerable attention is given to stock-raising. The chief manufactures are flour, foundry and machine-shop products, agricultural implements, tile, and brick. The trade is chiefly in farm products, live-stock, and manufactures. The city owns and operates the waterworks. Pop. (1910) 4,616.

**Newton, Kan.**, city, county-seat of Harvey County; on the Atchison, T. & S. F., and the Missouri P. R.R.'s; about 201 miles southwest of Kansas City and 115 miles southwest of Topeka. It is in the south central part of the State, in the valley of the Arkansas River, one of the most fertile sections of Kansas. It was settled in 1871 and incorporated a city in 1880. The

chief manufacturing establishments are flour mills, drill factory, separator factory, creamery, large ice plant, and stock yards. It is a division point of the Santa Fé Railroad and has repair shops. The number of railroad employees who are residents of Newton is about 500; and about 200 men are employed in the manufacturing establishments mentioned. There are 15 churches for white people and two for the colored. It is the seat of Bethel College, the only college in America under the auspices of the Mennonite Church (1904). It has a high school, good public and parish, schools, and a Carnegie library. The three banks have a combined capital of \$160,000. The government is vested in a mayor, who holds office two years, and a council of eight members, also elected biennially. The majority of the people are native born; the foreign born are Germans, Irish and French. Pop. (1910) 7,862.

J. C. MACK,  
*Manager, 'Kansas Republican.'*

**Newton, Mass.**, city in Middlesex County; on the Charles River, and on the Boston & A. railroad; six miles west of Boston. The area is 18 square miles; the city includes 13 villages. It was settled in 1631 and was part of Cambridge until 1688, when it was incorporated as a town under the name of New Cambridge, which name it retained until 1692; the city charter was granted in 1873. Newton is a beautiful residential city; within its limits is a part of the Metropolitan Park; its own city parks cover an area of about 170 acres. A large cemetery, in a prominent part of the city, contains the graves of many people noted in history. Newton has some manufacturing establishments, chief of which are boot and shoe factories, silk mills, fire-alarm supply works, rubber works, paper-box and curtain factories, printing works, worsted mills, and cordage factory. It has the Lasell Seminary for women (1851); the Allen School for boys (1853); Saint John's Industrial School, the Newton Theological Seminary, opened in 1825 under the auspices of the Baptists, and a public library which contains about 62,000 volumes. The prominent public buildings are several beautiful churches, the high school, the elementary and parish schools. Near the site of Waban's Wigwam, where John Eliot began to preach to the Indians, 28 Oct. 1646, stands the Eliot Memorial.

The annual municipal expenditures for maintenance and operation are about \$1,000,000. The chief items of expense are: for public schools, \$200,000; for streets, parks, sewers, \$172,000; interest on debt, \$264,000; police department, \$69,500; fire department, \$59,000; municipal lighting, \$54,000; health department, \$22,000; charity, \$26,000. The government is administered under a revised charter of 1902, which provides for a mayor who holds office two years; and a board of aldermen consisting of 21 members, three from each ward. The mayor and aldermen appoint or elect the administrative officials, except the school board, which is chosen at a popular election and for a term of three years. The city owns and operates the waterworks. Pop. (1900) 33,587; (1910) 39,806. Consult Smith, 'History of Newton.'

**Newton, N. J.**, town, county-seat of Sussex County; on the Delaware, Lackawanna & W. railroad; about 40 miles northwest of Newark. It is in an agricultural region, and in the vicin-

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ity are slate quarries. The chief manufactures are roofing slate, silk, paper boxes, shoes, and dairy products. It is the seat of the Newton Collegiate Institute and it has the Dennis Library, which contains about 9,000 volumes. Newton is known as a summer resort. The town owns and operates the waterworks. Pop. 4,700.

**Newton Theological Institution.** See NEWTON, Mass.

**Newto'nian Philosophy.** See NEWTON, SIR ISAAC.

**Newtown, N. Y.,** since 1898 a part of the borough of Queens in New York city; formerly a separate town in Queens County. It was settled in 1652 by people from New England, and was first called Middleburgh. In 1664 it became a part of Connecticut and was then called Hastings. The following year it came into possession of New York and the name was changed to Newtown. Consult Riker, Jr., 'The Annals of Newtown.'

**Next Friend,** in law, an adult, other than a guardian, who represents in an action, another person not legally competent to maintain a suit in his own behalf. The practice originated in England in the time of Edward I. A next friend is not a party to an action but acts solely for another, and is considered an officer of the court.

**Ney, nâ, Michel,** Duke of Elchingen, Prince of the Moskva, French soldier: b. Sarrelouis (Moselle) 10 Jan. 1769; d. Paris 7 Dec. 1815. In 1787 he entered the military service. He soon attained great distinction for bravery, was quarreled over by Kleber and Jourdan as to who should have his services, contributed greatly to the victory of Hohenlinden, and obtained the marshal's baton in 1804. He opened the campaign of 1805 against Austria by a brilliant victory at Elchingen 14 October (whence his title Duke of Elchingen), and brought about the capitulation of Ulm. He occupied the Tyrol, and marched on to Carinthia, when stopped in his career by the Peace of Presburg. In 1806 and 1807 he fought at Jena, and after the capture of Magdeburg at Eylau and Friedland. In 1808 he maintained his high reputation in Spain. Napoleon recalled him, but kept him at a distance till the commencement of hostilities against Russia, when he received the chief command of the 3d division of the imperial forces. He commanded the centre at the battle of the Moskva, and so distinguished himself as to earn the title of Prince of the Moskva. In the conduct of the retreat, in which he commanded the rear-guard, his ability, valor, and devotion were conspicuously manifest, and he exerted himself to the utmost to save the wreck of the army. Napoleon and Murat had deserted. In 1813 he decided the victory of Lützen, assisted at Bautzen and Dresden, but was defeated by Bernadotte at Dennewitz. He was now obliged to retire to Torgau, but soon took the field again; chased the Swedes from Dessau; and fought at Leipsic and Hanau. When the enemy entered France he disputed every step of their progress. Brienne, Montmirail, Craonne, and Châlons-sur-Marne are shining names in the history of his battles.

After Napoleon's abdication, Ney took the oath of allegiance to the king, was made a peer,

and received the cross of Saint Louis and the command of the cuirassiers, dragoons, chasseurs, and light-armed lancers. He enjoyed marked distinction at court, and appeared to be entirely devoted to the Bourbons. When Napoleon landed on his return from Elba Ney collected a large force, was appointed its commander, and with many assurances of his zeal and fidelity to the king marched against the invader. But noticing the desertion of his soldiers and their inclination for Napoleon he regarded the cause of the Bourbons as lost. He joined Napoleon at Lyons on 13 March, and thus opened his way to Paris. Napoleon gave him the command of his left wing, which engaged with the British at Quatre Bras. At Waterloo he led the last charge of the Old Guard, and had five horses shot under him. His clothes were full of bullet-holes, and he fought on foot till night in the midst of the slain. He was tried for treason, sentenced (5 December) to death, and shot in the Luxembourg garden. "After the execution," says Lamartine, "bitter shame seized on every soul." It was universally regretted that Ney, the brave, had been chosen to suffer. Consult: 'Mémoires du Maréchal Ney' (1833); Rouval, 'Vie du Maréchal Ney' (1833); Nollett-Fabert, 'Eloge Historique' (1852).

**Nez Percé (nâ pēr-sâ) Indians.** See CHOPUNNISH; SAHAPTIAN.

**Ngami, ngā'mē, Lake,** Africa, in Western Rhodesia, north of the Kalahari Desert, a portion of a great prehistoric inland sea, when first visited by Livingstone and Oswell in 1849, about 20 miles long, 10 miles broad, and very shallow. Its only feeder was the Teoge or Kubango and its outlet the Botletli or Zuga. In the rainy season the water was fresh, but in the dry season the lake became a mere brackish marsh. Since 1890 the waters have gradually disappeared, the site of the lake now being marked by an extensive reedy marsh-land, some portions of which are utilized for growing corn.

**Ngan-Hui, n-gān-hwē', or Ngan-Hwei,** n-gān-hwā'ē, China, an eastern inland province, intersected by the Yang-tse-kiang, separated from the ocean eastward by the provinces of Che-kiang and Kiang-su, and bounded northwest by Ho-nan, west by Hu-peh, and south by Kiang-si. Area 54,810 square miles; pop. about 24,000,000. Capital Ngan-king-fu (q.v.).

**Ngan-King-Fu, n-gān' king' foo',** China, a city and river-port, capital of Ngan-hui (q.v.), on the north bank of the Yang-tse-kiang, about 200 miles above Nanking, since 1897 open to foreign trade. It suffered severely during the Tai-ping Rebellion. Pop. about 50,000.

**Ngornu, n-gör'noo, or Angornu,** Africa, a town of Bornu, British Northern Nigeria, on the southwest shore of Lake Chad, 15 miles south of Kuka, the capital. It is on the trade route communicating with the interior and the coasts, and its fairs are of great commercial importance. The town is subjected to inundations from the lake during the wet season. Pop. (est.) 40,000.

**Niagara, nī-äg'a-ra, Battle of.** See LUNDY'S LAKE, BATTLE OF.

**Niagara Falls,** Canada, a town of Welland County, Ontario, on the west bank of the Niagara Gorge, just below the Falls, and opposite Niagara Falls, N. Y. It communicates with

## NIAGARA FALLS

the United States by three bridges, has electric and steam railroad service, and is a station on the Michigan Central, Grand Trunk, and Saint Catharine's & Niagara Central R.R.'s. It commands the best view of the Falls from Queen Victoria Niagara Falls Park, extending above and below the Falls for two and a half miles. An enormous electric power plant, larger than that on the United States side, has been constructed to utilize the water power. The town was originally named CLIFTON or SUSPENSION BRIDGE after its English prototype at the Severn Gorge, Bristol (q.v.).

**Niagara Falls, N. Y.**, city in Niagara County; on the Niagara River, and on the New York C. & H. R., the Wabash, the Erie, the Michigan C., the Grand T., the West S., and the Lehigh R.R.'s; about 25 miles north by west of Buffalo. Until 1892 what is now the city constituted two separate villages, Niagara Falls and Suspension Bridge; they were consolidated in that year and chartered as a city. (For the New York State Reservation and the bridges connecting the city with the town of Niagara Falls (q.v.), Ont., see NIAGARA FRONTIER.) The manufacturing establishments have increased and are increasing since the utilization of the power of the river by the new methods. The chief manufactures are paper, flour, dressed lumber, wheat biscuit, electro-chemical products, foundry products, machinery, chemicals, and wood products. It has a public library, the building for which was donated by Andrew Carnegie, a high school, business schools, public and parish schools, the De Veaux College (P. E.), and the Niagara University (q.v.).

On account of the Falls, one of the scenic wonders of the world, the city is visited annually by thousands of tourists. The government, administered under the original city charter, provides for a mayor, who holds office one year, and a council. The administrative officers are appointed or elected by the mayor and council. The assessed value of real estate (1910) was \$23,821,800. Pop. (1910) 30,445.

**Niagara Falls.** The Niagara River is about 32 miles long from its beginning at Buffalo to its termination at Fort Niagara; it connects Lake Erie, 573 feet, with Lake Ontario, 247 feet above the ocean, and carries the drainage of Lakes Superior, Huron, Michigan, Saint Clair, and Erie, estimated at a flow equal to 20,000,000 cubic feet of water per minute by the way of the Saint Lawrence into the ocean. About 20 miles from Buffalo and 12 miles from Fort Niagara are situated the Falls of Niagara, in 42° 55' N. and 79° 5' W.; the "Thunder of Waters" of the aborigines; the "most awe-inspiring spectacle" ever seen by Father Hennepin in all his travels, when he first viewed them in 1678; the point toward which 3,000,000 of people travel annually from all parts of the American continent and from Europe. Here the waters which have descended 50 feet in a series of rapids within half a mile make a sudden plunge of 165 feet in two divisions. The American Fall, with a more or less straight crest of 1,000 feet in length, extends along the eastern bank of the river in a north-northeast and south-southwesterly direction; while the other division, the Horseshoe or Ca-

nadian Fall, with a deep curve in the centre, runs at right angles to the course of the river. The crest of the latter measures 3,010 feet and carries by far the largest volume of water. The line of deepest water is accepted at about the middle of the Horseshoe Fall, and as that more or less imaginary line forms the boundary between the United States and the Dominion of Canada, the islands at and near the Falls of Niagara are all United States territory. From the foot of the Falls the river descends among cliffs of 200 to 350 feet high in a series of rapids for a distance of three miles until it reaches the Whirlpool, a circular excavation in the westerly bank of the river, the boundaries of which are rocky cliffs 300 feet high for about two thirds of its circumference, while the other third, its northerly bank, is made of an accumulation of sand, gravel and clay. Into this hole the river rushes with tremendous force and speed, in a northwesterly, but has to turn at right angle and leave it in a northeasterly, direction. The impact of the inrushing water, striking against the banks, meets in its recoil new waters looking for an outlet, and the meeting of these different currents produces the rotary movements of the waters from which the Whirlpool derives its name, and as an exhibition of wonderful water-power the Whirlpool and the Whirlpool Rapids are looked upon by many visitors as more interesting than the Falls themselves. A further series of rapids carry the water to Lewiston, at the foot of Lewiston escarpment. Here the gorge ends and the river flows in a low plain down to Lake Ontario. The width of the gorge varies from 700 feet at the Whirlpool Rapids to 1,700 feet opposite the centre of the American Fall. These measurements are for the tops of the gorge; at the water line these figures are usually reduced one half on account of the talus which has accumulated; thus, the gorge at the inlet to the Whirlpool measures 1,000 feet at the top and 550 feet at the water. The outlet of the Whirlpool has a width of 900 feet at the top and 450 feet at the water. After the river leaves the gorge at Lewiston it has a fairly uniform width of 2,000 feet.

The narrowest part of the river is at Foster's Flats, about one mile below the Whirlpool, on the Canadian side. Although the tops of the banks here are 1,500 feet apart, the river is scarcely 300 feet wide. A platform of limestone projects out into the river, and from its base a well-marked dry channel leads northward for about one third of a mile to the edge of the water. The floor of this channel is strewn with huge limestone blocks, and its westerly bank is continuous with the steep wall of the present gorge.

The depth of water on the crest of the American Fall is fairly well known, and measures from 4 to 10 feet; northerly and easterly winds at times set the water back in Lake Erie, and the fall has been known to be almost dry. The depth of the Horseshoe Fall is not known. The only attempt to obtain any approximate idea was made many years ago; an old vessel was loaded down with stones until it drew 20 feet of water, and started down the current; it went over the edge without touching, hence the conclusion was that the deepest water on the edge of the Horseshoe Fall is at least 20 feet



## NIAGARA FALLS

The depth of water in the river has been usually overestimated by hundreds of feet until the United States Lake Survey has given us a series of soundings as follows:

	Feet
At the foot of the centre of the Horseshoe Fall .....	150-200
Through the upper gorge to the Whirlpool Rapids .....	160-190
Whirlpool Rapids .....	35
Whirlpool .....	150
Whirlpool outlet .....	50
Gorge below Whirlpool.....	35-70

Of course, with such tremendous currents, twisting and whirling in all directions, soundings cannot be much more than approximate, but they dispel the idea of the many hundreds, and even thousands, feet of depth entertained before.

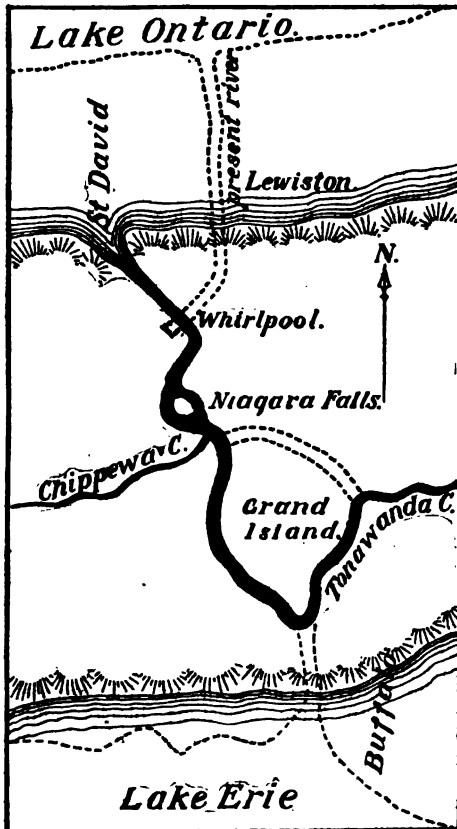
If we make an imaginary ascent from Lake Ontario for a geographic study, we find a vast plain, seven miles long from north to south and as far as the eye can reach east and west, which brings us to the so-called first limestone terrace of New York, more popu-

dashes the Niagara River, and three miles to the west another about one mile in width, at the little town of Saint David's. Ascending this old valley in a southeasterly direction we arrive at the Whirlpool. Excepting this Saint David's Valley and the gorge of the Niagara, the land to the south of the escarpment is fairly level until we meet above the Falls two shallow valleys; on the west that of Chippewa Creek and on the east that of Tonawanda Creek, tributaries to the Niagara River. The southern bank of the valleys of these creeks is formed by the second limestone terrace of New York, which runs through Canada, forms partly the north shore of Lake Erie, crosses Niagara River, presents a very conspicuous unit in the landscape of northern Buffalo, and runs in a west-southwest and east-northeast direction through western New York.

The life history of Niagara Falls is of supreme importance to the geologist to-day, as its complete elucidation would give a measurement of the time elapsed since the disappearance of the northern ice sheet of the Glacial period. Since the time of Hall and Lyell, in 1842, up to the present of Walcott and Grabau, the problem has been attacked with vigor and care, and viewed and reviewed from every possible standpoint and according to the varying theories of the time. Spencer, Pohlman, Upham, Taylor, Wright, Hitchcock, Bishop, are the names of but a few of those who have studied the problem, and there is still variety enough of opinion to interest many more. As a matter of estimates of the age of the Falls, the consensus of geological opinion varies between 5,000 and 50,000 years, and demonstrates that this absorbing study is far from being exhausted.

The site of the present Niagara Falls and river was in general outlines determined in preglacial times, when the American continent stood at an elevation of from 2,000 to 5,000 feet higher than at present. A system of large rivers had excavated the present basin of Lake Erie, and the combined drainage of these valleys found its way into the present basin of Lake Ontario by the way of the Dundas Valley and the city of Hamilton, Ontario. These rivers could not have drained along the present Niagara River, because the inlet at Buffalo was closed by the limestone terrace, the top of which was from 100 to 150 feet higher than the river-bed which had been excavated to the south of it, the valley of which now forms the eastern end of Lake Erie. The rock bottom of Lake Erie is almost everywhere covered by a deposit of clay and gravel to the height of 100 to 300 feet and at its eastern end the real lake bottom is from 80 to 100 below its apparent bottom. The present Niagara River flows at Buffalo over rock at a depth of from 14 to 16 feet.

With the continent at several thousand feet higher above the ocean level than to-day, these large river valleys could excavate their beds deeper down than at present, and we can understand why the bottom of all the Great Lakes, with the exception of Lake Erie and Lake Saint Clair, is about 500 feet below the ocean level. During the same period the present Tonawanda and Chippewa creeks had excavated a shallow east and west valley in the



Preglacial Drainage.

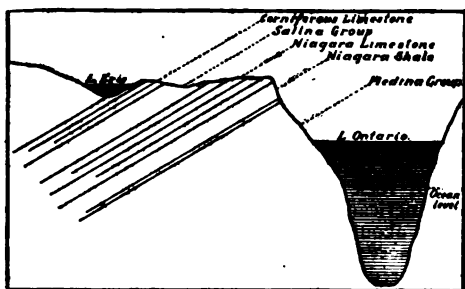
(Dotted lines, present drainage; black lines, preglacial drainage.)

larly known on the American side as Lewiston Heights, on the Canadian side as Queenston Heights. Here we ascend suddenly 250 feet. In this escarpment we have two gaps, one about one quarter of a mile wide through which

## NIAGARA FALLS

soft shale of the Onondaga Salt group, and combining their waters, they found their way north by the way of Goat Island, upper gorge, Whirlpool, and Saint David's Valley into the basin of Lake Ontario.

The action of small streams under similar conditions, excavating their gorges and finding their way north over the same strata as those at Niagara, can be studied to advantage in the 14-mile creek at St. Catharines, Ontario, or at Oak Orchard Creek or in the Genesee River of New York. Beginning at the mouth of these creeks and traveling up-stream, we find three falls, one over the sandstone layer of the Medina group, one over the Clinton limestone, and the largest over the Niagara limestone, near the top of the escarpment. These falls are connected with each other by a longer or shorter series of rapids. In an attempt to reconstruct the preglacial Niagara Valley by the data learned from a study of these creeks, we ascend the valley of Saint David, and find our first fall over the Medina sandstone at the Whirlpool, and the second and third higher up, perhaps somewhere near the present railway bridges. Whether this little stream originally outlined the Falls' islands, must remain a matter of conjecture at present; suffice it to say that beginning at the northerly part of Buffalo, we have a continuous preglacial valley draining northward by the way of the Whirlpool and Saint David, while the lake basin to the south of the Buffalo watershed was at least 150 feet below the top of the limestone terrace, and drained to the west.



Cross Section between Lakes Erie and Ontario.

The geologic section of the Niagara region from Lake Ontario to Lake Erie exposes the following strata of the Silurian: The Medina series, sandstones and shales, distinguished in this section by their bright red color; the Clinton series, shales and limestone; the Niagara shale and limestone; the Salina series, gypsum and shales in varying thickness; the Waterline group. Of the Devonian: the Corniferous and Helderberg limestones. As the strata dip in this section about 20 to 25 feet to the mile from north to south, and our ascent is from north to south, we successively meet all the series from the Medina group to the Niagara limestone as we travel up the gorge along the cut of the New York Central Railroad; but for a comprehensive view of an ideal geologic section the walls of the gorge at Lewiston must be studied. Beginning at the water's edge we have about 230 feet of shales and sandstones of the Medina series, of red color; above this 32 feet of Clinton limestone and shale, of greenish and white col-

or; overlaid by 70 feet of gray colored Niagara shale and 20 feet of drab colored Niagara limestone. This strata of limestone increases in thickness as we ascend the gorge until it reaches about 130 feet at the head of the rapids above the falls. The upper 50 feet of this limestone is thin-bedded and offers but little resistance to erosion, but below these are 70 feet of thick-bedded resistant stone, and the falls rush over the edge of this, making profile of the Falls: compact Niagara limestone 70 to 80 feet; Niagara shale 70 feet; Clinton limestone 10 feet.

Ascending in our geologic series from the Falls southward, we have the valley of Chippewa and Tonawanda creeks excavated from the soft shales of the Salina series; the southern boundary of these valleys consists of bold cliffs formed by the Waterlime, Corniferous, and Helderberg groups, and is succeeded on the south by the erosion of the basin of Lake Erie in the soft shales of the Hamilton group.

With the advent of the ice period the drainage system of the North American continent underwent a change. In the Niagara section the ice, advancing from the north and east, filled the basin of the Ontario Valley, and the streams flowing into it had to find an outlet toward the south. This was undoubtedly the time when the combined Tonawanda and Chippewa creeks, set back on the north, overflowed their southern boundary at Buffalo, the second limestone terrace, and drained into the valley of Lake Erie, 150 below, which overflow finally eroded the present inlet of the river.

The disappearance of the ice sheet in its recession northward gave birth to immense glacial lakes whose northern drainage was stopped by the southern face of the ice. With the constant increase of these water masses by the more or less rapid melting of the ice sheet, the outflow was at different times in different places of the divide to the south by the Mississippi or the Mohawk valleys. At times slowly, at times faster, the level of these glacial lakes lowered; the continent which previous to the Glacial epoch had stood several thousands of feet higher, lowered in a general way and tilted in circumscribed areas. While the ice slowly retreated, the main outlet of the area which covered Lake Erie and its surroundings was by the Wabash River into the Ohio, 200 feet above the present level of the lake. The shore lines of this vast body of water can be traced for hundreds of miles, and like similar shore lines around Lake Ontario, were early chosen for highways or for the founding of settlements.

When finally the lake level had lowered down to Lewiston Height, we would have Lake Erie at about 30 feet higher than at present, pouring its waters in a broad lake-like expansion through the gap at the present site of Niagara Falls and islands, and flowing in a broad expanse over the edge of the escarpment. As Lake Ontario lowered, the overflowing waters found the lowest point in the escarpment near the site of Lewiston and commenced to erode the present gorge. It will hardly do to speak about Falls at Lewiston in the proper sense of the word, because the comparatively thin layer of Niagara limestone on the top with vast masses of soft shale beneath did not offer resistance enough to the immense drainage for

## NIAGARA FALLS

the formation of a fall, but made the work of erosion easy and formed a series of rapids as the level of Lake Ontario lowered. This newly formed gorge eating its way southward soon met the ancient channel of the combined waters of the Tonawanda and Chippewa creeks at the present whirlpool, and from here found it easier to erode the drift filled preglacial valley up to the Falls, than to form a new gorge. In this way we can account for the right angle formed by the river between its inlet and its outlet at the whirlpool.

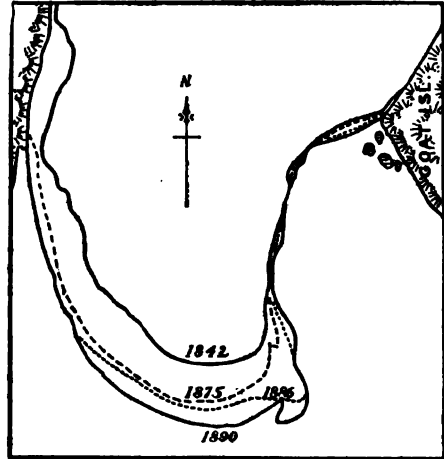
Whether the peculiar short valley at Foster's Flats gives us the place where the great cataract halted for a while divided by an island; whether it was the full force of the present current which produced this peculiar phenomenon, or whether a mass of water, much reduced on account of the tilting of the lake outlets, gives a more satisfactory explanation, must be left to future investigations.

Beyond doubt the immense volume of water eroded its way southward in the preglacial channel. Rapidly obliterating the small fall over the Clinton limestone, it left the fall which originally tumbled over the Medina sandstone as a long series of rapids both at the inlet and the outlet of the whirlpool and traveled to the south along the ancient gorge as one fall. The increasing thickness of the Niagara limestone retarded its southward progress more and more, hence any attempt to speak about the age of the gorge at the present time must be accepted with a wide margin. Receding southerly as one fall until probably opposite the northern end of the American fall, Goat Island and the other small islands on the American side, came into consideration and the Falls divided. The largest volume of water remained in the clearest and deepest channel, westerly of Goat Island, while the lesser volume divided itself among the islands and remained on the American side. From this time on, the Falls, looked upon as one, ceased to travel straight southerly, but swung round in a circle with the northern point of the American fall as the centre. The Horseshoe Fall, owing to its clearer channel and larger volume of water, receded faster, eating away the westerly side of Goat Island, and at present it already swings its way around the southerly side of Goat Island, indicating that at some near future geologic time, it will draw away all the water from the American side, leaving the present American Falls and the islands high and dry and wending its way southerly and easterly again as one cataract.

The oldest drawing and description of the Falls of Niagara have been handed down to us by Father Hennepin, the first white man who saw them, in 1678. He says they are "above six hundred feet high," and we can forgive his exaggeration in view of his enthusiasm, for very few people of to-day, when seeing the falls for the first time, and not having their minds biased by figures, are capable of forming even an approximately correct estimate of the height from which the waters tumble down; one half will over-estimate it immensely, while the other half will err to an equal extent on the other side. Very much depends upon the spot from which the first view is obtained.

The first scientific survey of the Falls was made by Prof. James Hall, State geologist of

New York, in 1842, and his work has formed the foundation of all subsequent surveys. The most interesting part of all these surveys is that they demonstrate the changes which have taken place in recent times in the crests of the Falls. A comparison of the surveys of 1842, 1875, 1886 and 1890 shows that the American Fall has receded at the rate of 0.64 foot per year, or 30.75 feet between 1842 and 1890, and the Horseshoe Fall during the same period 2.18 feet annually, or 104.51 feet in 48 years, a very much higher rate of recession than



Recession of Horseshoe Fall.

was dreamed of prior to the second survey in 1875 and its discussion in 1883. Of course the Falls do not recede evenly, some parts of the crest remain more or less stationary while others change rapidly. The figures above represent the points of greatest activity. The total area of rock surface which has disappeared at the American Fall between 1842 and 1890 represents about 33,000 square feet or three fourths of an acre; at the Horseshoe Fall there has disappeared during the same period 275,000 square feet or 6.3 acres. In all descriptions of the American Fall we speak of one, although there are two; but the second one, the Luna Fall, is so small that it is ignored. It is interesting only as it affords the visitor an opportunity to go in behind the falling waters into the so-called "Cave of the Winds."

Geologists have often indulged in speculations regarding the future of Niagara Falls, and how many thousands of years it would take before the increasing thickness of the Niagara limestone and the decreasing exposure of the soft underlying shales would reduce the height of the Falls to a minimum or even to a mere series of rapids. Judging from present indications, the utilitarian spirit of the age will destroy this wonder of nature long before any changes produced by the natural course of events can mar its beauty or diminish its grandeur. With the discovery of long distance electric transmission there have sprung up, on both sides of the river above the Falls, water power plants for the production of electricity, each one of which robs the Falls of a certain amount of water; these will multiply unless the

## NIAGARA FALLS POWER-WORKS—NIAGARA FRONTIER

State of New York and the Province of Ontario co-operate and adopt laws to prevent any additional withdrawal of water by the plants now existing, as well as by the formation of new power companies.

Twenty years ago New York State paid \$1,500,000 for the present reservation and placed it under State control "to preserve the scenery of the Falls of Niagara, for in all that is grand and sublime in the works of nature, there resides a power to educate and refine which is of inestimable worth." The Province of Ontario took the same course very soon after; and it behooves the present century to see to it, by the most stringent laws, that this sublime legacy of the last century, the Reservation at Niagara, American and Canadian, is handed down to future generations unimpaired by commercialism and fit to fulfil its grand mission among the educational forces of the world, for the waters of the Falls of Niagara do not belong to a few companies, or to New York State or to the Dominion of Canada, but they belong to mankind, irrespective of nationality or color.

DR. JULIUS POHLMAN,

*Late Professor University of Buffalo.*

**Niagara Falls Power-works.** See NIAGARA FRONTIER.

**Niagara Fort.** See FORT NIAGARA.

**Niagara Frontier,** common designation of the region bordering the Niagara River, 37 miles long, between Lakes Erie and Ontario, presenting features of exceptional scenic, scientific, historic, political and industrial interest.

**Geographical and Scenic.**—The general course of the Niagara is a little west of north, through a flat country from Lake Erie north for more than 20 miles. Some seven miles south of Lake Ontario, in the main parallel with it, in the Niagara region, is an abrupt declivity, approximately a prehistoric shore-line, the country north of it being some 400 feet lower than the general level to the south of it. From this escarpment to Lake Ontario the country is exceedingly fertile, famous for its peach, quince, plum, and apple orchards, and other fruits. Through this section the river flows with a slackened current, between alluvial banks. From the escarpment, southerly, the river has cut a gorge 200 to 400 feet deep, back seven miles, through which the Falls of Niagara have receded to their present position. This portion of the river is, except for a navigable mile below the Falls, a wild rapid, and includes the Niagara Whirlpool. From Lake Erie to within a mile of the upper rapids, less than two miles from the cataract, the Niagara is navigable. At the northern limits of the city of Buffalo, it branches, embracing Grand Island, area 17,381 acres (8 miles long, 6 miles wide), a township of Erie County, N. Y. The international boundary line lies in the middle of the river, following the west channel and passes through the apex or principal angle of the Horseshoe Fall. With the exception of Navy Island, which belongs to Canada, in the west channel near the foot of Grand Island, the islands belong to New York State; principal ones are Squaw, Rattlesnake, Strawberry and Cayuga, New York side; Beaver, near head of Grand Island; Buckhorn, foot of Grand Island; and Tonawanda. The Niagara receives, from the east, Gill, Cayuga, Tonawanda and Scajaquada creeks, the last-named flowing

through the city of Buffalo and making its principal Park Lake. (See BUFFALO.) From the west, the Welland is the chief tributary, an important navigable route in pioneer days, and still popular with canoeists.

The scenically famous part of the Niagara begins, on the north, at the edge of the escarpment, and runs southerly seven miles, culminating in the great cataracts. The general form of the precipice over which the river plunges is that of an irregular horseshoe, divided by Goat Island. The eastern or American Fall has nearly a straight contour line, width 1,060 feet, height 167 feet. Luna Island separates a small part of the American Fall, on the Goat Island side, from the main body. Behind this Luna Fall is the Cave of the Winds, a natural chamber eroded by the water (projected against the cliffs by air-blasts) about 100 by 75 feet in dimensions. The gorge opposite the American Fall is 1,250 feet wide. The Horseshoe or Canadian Fall, the grandest single feature of the Niagara region, was in 1890, 3,010 feet long; continued recession has no doubt increased the length; the height at the apex of the curve is 158 feet. Adjoining the cataracts on both American and Canadian sides are groups of islands, surrounded by rapids, presenting many minor features of great beauty and interest. On the American side, Green Island (formerly Bath), Goat, the Three Sisters, Little Brother, Ship, Brig, Robinson, and others (the last four named inaccessible to visitors) are included, with a strip of the mainland 106 acres in all, in the New York State Reservation. On the Canadian side, Cedar Island and the Dufferin Islands, above the great fall, are a part of the Queen Victoria Niagara Falls Park. About three miles below the Falls the river turns from northwest to northeast and at the elbow forms the Whirlpool, of greater interest to the geologist than to the casual tourist. Between the Whirlpool and the end of the gorge, points of interest are, on the New York side, the Devil's Hole, a wild ravine, lateral to the main gorge; and on the Canadian side, Niagara Glen, formerly Foster's Flats. The view from the edge of the escarpment, Canadian side, overlooking the village of Queenston and the low interval to Lake Ontario, is celebrated.

The level of Lake Ontario is 326 feet below Lake Erie; from Lake Erie to the rapids above the Falls, the descent is 10 feet; from the beginning of the rapids to edge of American Fall, 49 feet; from foot of American Fall to Lake Ontario, 100 feet. The discharge of the river is estimated at 15,000,000 cubic feet per minute, or one cubic mile per week.

On the edge of the escarpment two and one half miles east of Lewiston is the Tuscarora Indian reservation, 5,769 acres; a well-to-do farming community of descendants of the Tuscaroras who, being refugees from the South, joined the Five Nations Indians in 1715.

**Geological.**—The floor of Lake Erie at the mouth of the Niagara is Corniferous limestone. The dip is to the south, and as one proceeds northerly on the course of the river there are successively exposed the Onondaga and Corniferous limestones, the Salina group, including the hydraulic limestone; Niagara limestone, Clinton shales, Medina sandstones (upper gray, red, and gray quartzose), and red shales and sandstones, extending to Lake Ontario. Esti-

## NIAGARA FRONTIER

mates by careful students as to the time occupied by the falls in cutting the gorge from the escarpment to their present position vary from 5,000 to 50,000 years. Only since 1842 are there reliable data of recession. In that year James Hall, New York State geologist, made a trigonometrical survey of the Falls, marking the stations of observation with permanent monuments. Recent observations show that for the 48 years prior to 1890 the mean retrogression of the American Fall has been 7.68 inches per year; of the Horseshoe Fall 26.16 inches; a total area of recession for the American Fall of about three fourths of an acre, and for the Horseshoe Fall, of 6.32 acres. Erosion goes on most rapidly at the apex of the Horseshoe Fall.

**Botanical.**—The flora and silva of the Niagara region are remarkable only for the large number of species found in a small area. On the New York State reservation (106 acres), and in the immediate neighborhood of the river, have been found 909 species of flowering plants, ferns and other cryptogams, 758 of which are native. Goat Island (13.9 acres) is especially rich in species. Here, and at a few other stations in the vicinity, occurs *Hypericum Kalmianum*, L., which perpetuates the name of Peter Kalm, a Swedish botanist whose description of Niagara after his visit in 1750 is valuable. Among the ferns of the Niagara gorge, rare or not occurring elsewhere in Western New York, are the walking-fern, *Camptosorus rhizophyllus*, Link., *Aspidium Lonchites*, Swartz, and *Aspidium Bootii*, Tuckerm., ferns whose accustomed range is a hundred miles northward; also *Pellaea gracilis*, Hook., and *P. atropurpurea*, Link. The only sassafras trees of the region grow at the Whirlpool.

**History.**—The world's first knowledge of Niagara Falls and river was had from Samuel de Champlain's work, 'Des Sauvages,' 1604; but Champlain never saw the cataract, basing his allusion on reports of Indians. The oft-repeated statement that Jacques Cartier, in 1535, was the first white man to hear of the Falls is disproved, it being shown that statements attributed to him, and quoted by Marc Lescarbot ('Histoire de la Nouvelle France,' 1609), are really from Champlain's work of 1604. The first known visit of white man to the Niagara region was that of Joseph de la Roche Dallion, a Franciscan, who attempted missionary work in the Niagara peninsula in October 1626, and appears to have crossed the river, from west to east, near Lewiston. Two priests of the Society of Jesus, Jean de Brébeuf and Joseph Chaumonot, visited the Indians in the Niagara region, 1640-1; the Sulpicians, François Dollier de Casson and René de Bréhan de Galinée, passed the mouth of the Niagara, July 1669; but they did not explore the Niagara, entering Lake Erie by the Grand River, to the westward. With them was René Robert Cavalier, known as La Salle, who turned back, and seems to have become familiar with the Niagara region in that year. In December 1678, La Salle again came to the Niagara, and above the Falls built the Griffon, the first craft larger than a bark canoe, to navigate the upper lakes. The Griffon sailed 7 Aug. 1679; the site where the vessel was built, near the present village of La Salle, N. Y. (pop. 661), is marked with a large boulder and bronze tablet, suitably inscribed. With La Salle was Father Louis Hen-

nepin, a Franciscan (Recollect), whose book ('La Louisiane,' 1683) contains the first detailed description of the Falls. The first picture of Niagara Falls is in the 1704 edition of Hennepin's 'Nouvelle Découverte,' etc., first published 1697. La Salle was several times on the Niagara, as were his lieutenant Tonty and other followers of historic fame. La Salle made no permanent establishment, his attempted fort at the mouth of the river (Fort Conti), his stockade at Lewiston and house above the Falls being soon destroyed. In 1687 the Marquis de Denonville, after a campaign against the Iroquois in Central New York, came to the Niagara and built a fort at the mouth of the river, east side, called it Fort Denonville, and garrisoned it with 100 men. Sickness depleted the garrison and in 1688 the post was abandoned. No attempt to re-occupy the region was made by the French until 1719, when Chabert de Joncaire the elder built a trading hut at the present site of Lewiston. In 1725-6 Fort Niagara was built at the mouth of the river, and for 34 years it was the centre of French influence throughout a wide region, an important link in the chain of posts by which the subjects of Louis XIV. sought military and trade control of the Lakes and Ohio Valley. The original mess-house or "castle," somewhat modified, is still standing, probably the oldest building in the northern United States west of the Mohawk; two other buildings of the French period remain, adjoining. French domination on the Niagara ended 25 July 1759, when Fort Niagara and dependencies were surrendered by Captain Pouchot to Sir William Johnson.

Under the British, the Niagara was a centre of British-Indian alliance until the close of the Revolution. During the period of Pontiac's uprising, a band of Indians ambushed and massacred a British force returning from Fort Schlosser above the Falls to Fort Niagara, also a relieving force, in all about 100 men. This affair, 14 Sept. 1763, took place on the banks of the Niagara at the Devil's Hole ravine, into which many of the victims were thrown or driven alive. It was the last Indian demonstration against the British in this region. From the outbreak of the Revolutionary War parties were sent from Fort Niagara against the frontier settlements of New York and Pennsylvania. Here were planned the expeditions which resulted in the massacres of Wyoming, Cherry Valley, Bowman's Creek, and others. Sullivan's retaliatory expedition of 1779, against the Senecas of Central New York, drove in upon the British at Fort Niagara some 5,000 refugees, who became dependents on the British. To relieve this burden, the British, until the close of the war, were zealous in equipping and despatching from Fort Niagara scalping parties against the American settlers in the Mohawk, Susquehanna, and other frontier sections. Several hundred of the Senecas who fled from Sullivan, summer of 1779, settled the next spring on Buffalo Creek, thus making the first Indian village on the present site of Buffalo. (See BUFFALO.) The British maintained a garrison at Fort Niagara, and virtual control over the whole region, until 11 Aug. 1796, or for 13 years after the close of the war. During this "hold-over" period the present town of Niagara, Ont., at the mouth of the river, west side, was settled, beginning 1783, with people from the United States who re-

## NIAGARA FRONTIER

maintained loyal to Great Britain. These United Empire Loyalists, many of them families of culture and energy, gave a high character to society in the district, still maintained by their descendants. The development of the Canadian side of the Niagara was begun earlier than that of the New York side. Lieutenant-Governor Simcoe made Niagara the capital of Upper Canada (now Ontario) in 1792, the seat of government being moved to York (Toronto) in 1796. Queenston, Canada, opposite Lewiston, was founded as West Landing, 1789, by Robert Hamilton; in 1792 named by him Queenston, in honor of Queen Charlotte.

The War of 1812 paralyzed the development of the region, and the banks of the Niagara became the theatre of the most important land conflicts of that war on the northern frontier. On 12 Oct. 1812 the Americans under Van Rensselaer attempted to gain the heights at Queenston; owing largely to cowardice and insubordination of the militia the attempt failed, and the Americans were defeated; the British commander, Gen. Isaac Brock, was killed in the engagement; Winfield Scott, of the American regulars, was taken prisoner. On 13 May 1813, the American land forces under Dearborn and naval forces under Chauncey operated together against Fort George, nearly opposite Fort Niagara. Dearborn falling ill, the command devolved upon Scott. Fort George was taken, with the nearby village of Newark (Niagara-on-the-Lake). The British posts at Chippewa and Fort Erie were abandoned, and the entire Canadian frontier from Lake Erie to Ontario was in the hands of the Americans. In December the British compelled the evacuation of Fort George. The American general, McClure, in retiring, blew up the fort and burned Newark. In retaliation, the British crossed the river, captured Fort Niagara, and burned and laid waste the entire American frontier, the villages of Youngstown, Lewiston and Tuscarora, culminating in the destruction of Black Rock and Buffalo, 30-31 Dec. 1813. On 3 July 1814, the Americans under Scott and Ripley captured Fort Erie. On 5 July, at Chippewa Creek, the Americans were again victors. On 25 July was fought the battle of Lundy's Lane, also called Bridgewater or Niagara Falls, overlooking the cataract. The Americans, with a total force of less than 2,600, attacked the British (4,500, with nine pieces of artillery) and carried their position. Both Brown and Scott being wounded and carried from the field, command devolved on Gen. Ripley; before morning of the 26th, the British rallied, reoccupied their position, and claimed a victory. British losses stated in official returns as 876 killed, wounded and missing; American, 861; but historians give widely varying figures. The Americans retired to Fort Erie and fortified it. On August 3 they were besieged by the British General Drummond, 1,100 men; on the 15th, during an assault, the explosion of a magazine threw the British into confusion and they withdrew with heavy loss. On 17 September the besieged Americans made a sortie, one of the most brilliant movements of its kind in military history, capturing the works of the British and forcing them to abandon the siege. This was the last important engagement of the war on the Niagara Frontier, peace being restored by the Treaty of Ghent, 24 Dec. 1814.

From 1802 the American side of the Niagara

was opened for settlement under the operations of the Holland Land Company, which founded New Amsterdam, now Buffalo. Black Rock, four miles from Buffalo Creek, was merged in Buffalo in April 1853. The opening of the Erie Canal, 1825, gave great impetus to the whole region. The towns of Tonawanda (q.v.) and North Tonawanda (q.v.) owe their origin to the canal, and are now important as a point of lumber manufacture and of cargo trans-shipment from lake vessels to cars and canal-boats. Niagara Falls, N. Y. (formerly Manchester), now embracing Suspension Bridge (pop. 19,457) has evolved from its long-famous aspect of a tourist resort to a unique position among manufacturing towns. Lewiston (pop. 697), named for Gov. Morgan Lewis, on the site of La Salle's stockade of 1678, was a place of some importance prior to the railroad era, and a station on a much-traveled highway to the West. It now shares in the general immunity from business which characterizes Youngstown (pop. 547), five miles below, and Niagara and Queenston, opposite; the shipment of fruit and farm produce and the care and transportation of tourists are the chief industries of these old towns on the lower river. Fort Niagara, at the mouth of the river (reservation 288 acres), is a United States military post with modern buildings, rifle range, etc. Here are also standing several structures of the British and French periods of occupancy. The old magazine (1757) in which William Morgan was confined in 1826, for his anti-Masonic publication, is still shown. The Canadian side of the Niagara has no large town, the villages of Niagara-on-the-Lake (Ontario), Queenston opposite Lewiston, Saint David's, three miles west of Queenston, Stamford, one mile from the Whirlpool, Niagara Falls, Ont. (Drummondville), Chippewa, Bridgeburg and Fort Erie (formerly Waterloo), being either quietly rural or devoted to tourist and railroad interests.

Grand Island, a township of Erie County, a farming community, with numerous country seats, clubhouses, hotels and resorts on the shores, was the proposed site of Ararat, City of Refuge for the Jews, which Maj. Mordecai Manuel Noah zealously advocated. A cornerstone for the new city was prepared, 1825, but the project came to naught. Tonawanda Island, in the American channel opposite Tonawanda Creek, is almost wholly covered with lumber yards and mills; connected by bridge with the mainland. Navy Island (304 acres), in the Canadian channel, was the principal rendezvous of William Lyon Mackenzie and his followers during the uprising of 1837-8 known as the Upper Canada Rebellion, or Patriot War; the principal event of which on the Niagara was the burning of the steamer Caroline, in service for the rebels, by the Canadians, 29 Dec. 1837. Fort Erie village, near the ruined fort of the same name at outlet of Lake Erie, and Ridgeway, a few miles inland, were the field of exploit by the Fenians whose attempted raid into Canada was quickly suppressed, 1-12 June 1866.

**Bridges.**—The Niagara River is spanned by several notable bridges. The International (railway only), at Buffalo, was built by Sir Casimir Stanislaus Gzowski and Sir David L. Macpherson; begun 17 June 1871, opened for trains 3 Nov. 1873. It is of truss construction, 3,651½ feet long, supported by eight piers, three



## NIAGARA FRONTIER

of 197 feet span, three of 248 feet, and a double draw 362 feet long. The piers are in water from 9 to 48 feet deep, with a current varying from 5 to 12 miles an hour, the level of the river and the velocity of the current being chiefly affected by wind, which raises or lowers Lake Erie, the outlet of which is three and one half miles above the bridge. Originally of single-track width, it was widened and its capacity doubled, 1901-3. The upper steel arch bridge, below the falls, occupies the place of a suspension bridge, built 1869, destroyed by a gale in 1889, restored as a suspension bridge, and in 1895 replaced by the present structure, 1,240 feet long, height of floor above water 192 feet, width of floorway 46 feet, length of arch span 840 feet, said to be the longest bridge of its kind. One and a half miles below, spanning the gorge at the origin of the upper whirlpool rapids, is the steel cantilever bridge of the Michigan Central Railroad, built 1883; length 910 feet, height above water 245 feet; for railway only. A few rods below it is the lower steel arch bridge of the Grand Trunk Railway, which replaces the suspension bridge built by J. A. Roebling in 1858. The present structure, completed 1897, is 1,080 feet long, with a centre span 550 feet, the centre of the arch 226 feet above the water; upper track for railway, lower for carriage and foot passengers. At the north end of the gorge, between Lewiston and Queenston, a suspension bridge was erected 1899, replacing the first suspension bridge across the Niagara, built here in 1851 by Capt. E. W. Serrell, and destroyed by wind 1864. The present structure has a cable span of 1,040 feet, suspended span 800 feet, height above river 65 feet; opened for traffic 1889; one floor for foot, carriage and electric railroad traffic.

The scenery of the vicinity of the Falls was rescued from vandalism and proprietary greed by the action of New York State and the Government of the Dominion of Canada. Many enlightened minds had regretted but were powerless to stay the deterioration of the environs, long before the meeting in 1878 of Gov. Robinson of New York and Lord Dufferin, then Governor-General of Canada. To the latter is ascribed the first official expression which led to legislative action in both countries, for the preservation of Niagara. In 1884 New York State paid \$1,433,429.50 for Prospect Park, adjacent lands bordering the river, Goat and other islands; which now constitute the New York State Reservation at Niagara Falls, opened to the public 15 July 1885. The wise policy of the State has been to restore the environment to a condition of nature, with as little artificial work as consists with its use and enjoyment by the public. The park is free, maintenance coming from rentals of concessions and a modest annual appropriation from the State. The park is visited by more than half a million people yearly. The Queen Victoria Niagara Falls Park, on the Canada side, embraces 154 acres in the vicinity of the falls, including the Cedar and Dufferin islands, bought by the Dominion Government in 1885 for \$436,000; and also, subsequently acquired, a strip 66 feet wide along the river from Queenston to Fort Erie, about 90 acres at Niagara Glen (Foster's Flats), 100 acres at Queenston Heights, including the battle-field; and the site and ruins of Fort Erie. Franchises, especially to power plants, produce a large income.

By thus controlling the entire river front from Fort Erie to Queenston,—over 20 miles—the Dominion Government led the van for the preservation of historic sites on its frontier. Fort Erie (built by the British under Braostreet, 1764, present ruins dating from 1805-14), at Chippewa, and Queenston, battle-fields of the War of 1812 are preserved. On Queenston Heights is the Roman composite column in memory of Maj.-Gen. Sir Isaac Brock; a fluted shaft on a square pedestal, surmounted by a statue, the whole structure 190 feet high; a stairway of 235 steps leads to a gallery at the top. It stands 250 feet above the river; and in its vaults were reinterred, 13 Oct. 1853, the remains of Brock and of Lt.-Col. John McDonell. The shaft replaces an earlier and more modest monument, destroyed by miscreants, 16 April 1840. Near the foot of the hill is a small monument marking the spot where Brock fell; it was unveiled by Albert Edward, Prince of Wales, 18 Sept. 1860. At Lundy's Lane, near the Falls, but not included in the Government reservation, the burying ground contains numerous monuments to the soldiers who fell there. Similarly historic are the cemeteries at Niagara, Ont., Fort Niagara and Lewiston. Numerous historic sites on the American side have been marked by bronze tablets erected by the Niagara Frontier Landmarks Association.

*Utilisation of Power.*—Competent estimates place the potentiality of the Niagara current at 7,000,000 horse-power. After many years of more or less impracticable schemes, Thomas Evershed developed a plan which became the basis of the present successful undertaking to use the power on a large scale. In June 1890 an International Niagara Commission was established, authorized to offer prizes amounting to \$22,000 for the best plans for the purpose. For turbines the designs of Faesch and Piccard of Geneva were selected, and three experimental wheels were built from their plans by the I. P. Morris Co., Philadelphia. Two-phase alternating current dynamos with revolving fields were adopted; three were made and installed by the Westinghouse Company, Pittsburgh. The plan included a surface canal 250 feet wide, 12 feet deep and 1,700 feet long, extending laterally from the river. Parallel with this a wheelpit was dug 425 feet long, 18½ feet wide and 178½ feet deep. This work was about a mile above the Falls. From the base of the wheelpit a tunnel was made, 18 feet 10 inches wide, 21 feet high and 6,837 feet long, emptying into the river below the Falls. For the first 5,000 feet from its lower end the grade is .7 per cent; thence to the wheelpit .4 per cent. Construction of the tunnel was begun 4 Oct. 1890. Ten turbines, each of 5,000 horse-power, were installed in the pit, steel penstocks 136 feet long and 7.5 feet diameter carrying the water to them, the great tunnel serving as tail-race. Each turbine shaft, connected with the generators above, weighs, with connected parts, 150,000 pounds, and is so supported by the upward thrust of the column of water in the penstock that it revolves without friction on its bearings. The original installation of ten wheels and dynamos was more than duplicated, 1901-2, by the construction of a new wheelpit 463 feet 8 inches long, 18½ feet wide, 178½ feet deep; connected with the old pit by a passage 130 feet below the surface. The discharge tunnel was extended 600

## NIAGARA INTERNATIONAL PARK — NIAS

feet to the new pit, making the total length of the tunnel 7,437 feet. The new power-house and pit are planned for the installation of 11 turbines and dynamos, each unit of 5,000 horse-power, a total production at this point of 105,000 horse-power. The turbines in pit No. 2 are of the internal discharge type, claimed to add 10 per cent to the effective head. Two types of generators are used: (1) an external field type with nickel steel revolving magnet ring; (2) an internal revolving field type, wound for 2,300 volts, 25 cycles, 2-phase, operated at 250 revolutions per minute.

Power operations on the Canadian side were actively begun August 1902, with the construction of a plant to develop 110,000 horse-power. A notable innovation was the use of dynamos of 10,000 horse-power each. In April 1902 the Dominion Government granted rights to the Ontario Power Company, which then planned to develop 150,000 horse-power. Instead of discharging by a tunnel, the water is received in flumes, carried to the brink of the gorge and dropped to the lower river through penstocks. The first two companies to begin operations at this point were backed largely by United States capital; a third company, largely Canadian, has been granted rights, the present plans of the three companies contemplating a total production at this point of some 600,000 horse-power. The Canadian Government exacts in all cases that 50 per cent of the power developed must be supplied to Canadian consumers if called for, the rest may be exported to the United States. On the American side, in the vicinity of the power-houses, a score or more of industries have located, chiefly employing smelting, electrolytic and chemical processes, and using in the aggregate about 25,000 horse-power. The International Railway system (electric) operating throughout the whole frontier, as far east as Lockport and to stations in Buffalo, some of them 32 miles from the generators, is a notable instance of the distributed use of Niagara power, which is also largely supplied for manufacturing establishments in Buffalo and elsewhere. Far-reaching plans are made for railway operation and factory supply on the Canadian side, and great developments are predicted for the near future. At Niagara Falls, N. Y., electric power is supplemented by hydraulic power. The original power canal, built 1853-8, has been much enlarged, notably since 1892, and now has a working capacity of 100,000 horse-power. Numerous establishments relying on this system use some 20,000 horse-power, with prospective increase. The industrial growth of the Niagara region in the past decade has been great, and indications point to still greater development in the coming decade. Public apprehension that the scenic features of Niagara will be impaired by the diversion of water for power purposes, is not borne out by test observations, the variation in the flow of the cataracts due to a change of wind often being far greater than any deemed possible under present power operations.

FRANK H. SEVERANCE,  
*Secy. Buffalo Historical Society.*

**Niagara International Park**, on both sides of Niagara River at Niagara Falls, a reservation for public purposes established by the joint action of the legislature of the State of New York and the parliament of the Dominion of Canada. See **NIAGARA FRONTIER**.

**Niagara-on-the-Lake, Canada**, a town of Lincoln County, Ontario, at the mouth of Niagara River, on the west bank, twelve miles below Niagara Falls, and 36 miles by water from Toronto. It is a pleasant summer resort. It was burned down in midwinter 1843, by the Irish-American General McClure during his retreat, an unnecessarily savage action that was deplored by both sides and led to cruel reprisals. Pop. about 1,500.

**Niagara Series**, in geology, the earliest strata of the Upper Silurian era, preceding the Onondaga Series and the lower Helderberg Series. It, in turn, is subdivided into the strata of the Medina epoch, those of the Clinton group, and those of the Niagara formation. None of these three is continental in extent, but all are important, are very rich in fossils, and consist of sandstones, limestones, and shales. The Medina formation is made of Oneida conglomerate, a hard, light gray rock made up of quartz pebbles and sand, and covering Herkimer, Oneida, and Ulster counties, New York, a part of Virginia, and east Tennessee; and of Medina sandstone in western New York. The Clinton formation, shaly sandstone in New York and Pennsylvania, and more completely limestone further west, occurs in Ohio, Indiana, Wisconsin, Tennessee, Kentucky, Alabama and Georgia; and is marked by the occurrence of oolitic argillaceous hematite. The Niagara formation is a thick limestone, underlaid with shale; the wearing away of the latter undermines the limestone as at Niagara Falls. The Niagara group occurs in New Hampshire, Connecticut, Ohio, Illinois, western Tennessee, northern Kentucky, Missouri, Arkansas, and (scantly) in the Rockies. The fossils of the series are mollusks, corals, crinoids, etc.; apparently there are no land or fresh-water animals.

**Niagara University**, a Roman Catholic theological institution at Niagara Falls, N. Y. (q.v.), founded by the priests of the Congregation of the Mission in 1856. In 1910 there were connected with the school 30 professors and 325 students. The library contains about 13,000 volumes; the grounds and buildings are valued at \$50,000. The students come from all parts of the country, and after ordination return to their respective dioceses.

**Niam-Niam**, nē-ām' nē-ām'. See **NYAM-NYAM**.

**Nian'tic Indians**. See **NARRAGANSETT INDIANS**.

**Nias**, nē-ās', Dutch East Indies, an island in the Indian Ocean, off the southwest coast of Sumatra, from which it is separated by a strait 60 miles wide. It is about 70 miles long, 20 miles average breadth, area 2,100 square miles. The surface is mountainous, attaining a maximum altitude of 1,970 feet. In 1857 when the Netherlands took possession of the island, the population was reckoned at 17,000. The Niassers are of the Malay race, but fairer than the usual type. They are industrious and frugal, expert handicraftsmen, temperate and regular in their habits, but inclined to be avaricious, vindictive, and sanguinary. The chief vegetable products are rice, cocoanuts, bananas, tobacco, sugarcane, etc., and annually about 110,000 pounds of pepper. Hogs are reared, and there is a domestic

## NIATA—NIBLO'S GARDEN

export trade with Sumatra in rice, yams, beans, and poultry. Pop. est. 200,000.

**Nia'ta**, or **Nata**, a breed of Argentine cattle, which long ago started among the Pampas Indians, and is now nearly or quite extinct. They were really deformed, the parts of the face being so out of proportion as to give the face a queer pug-like appearance. They were very interesting to the students of evolution as an example of a variant which maintained its peculiarities through a long period, breeding "true," and showing no reversion to the normal type.

**Nibby**, *nēb'bē*, **Antonio**, Italian antiquarian: b. Rome 1792; d. there 1839. He was one of the founders of the Academy of the Tiber and in 1814 was secretary to Louis Napoleon. He later became professor of archæology in the College of Rome and in the School of France. He wrote: '*La Grecia di Pausania*' (1817-18); '*Elementi di Arohæologia*' (1828); '*Album di Roma*' (1834); '*Analisi Storicotopografico-antiquaria della carta de contorni di Roma*' (1837-8); etc.

**Nibelung**, *nēb'ē-loong*, in Scandinavian mythology, a monarch whose subjects are called Nibelungs and territory the Nibelungenland. There were two contemporary kings in this realm, against whom Siegfried, Prince of the Netherlands, fought. He slew the 12 giants who formed their paladins with 700 of their chiefs. The word Nibelungen is from *nebel* (darkness), and means the children of mist or darkness.

**Nibelungenlied**, *nēb'ē-loong''en-lēt*, **The** (Song of the Nibelungen), or **NIBELUNGEN NOTH** (Nibelungens' Need), an ancient German epic, ranking among the noblest works of imagination. The subject of this great epic is the dreadful fate of the Burgundians, caused by the passion of two princely pairs. The one pair are Siegfried, son of King Sigismund of Santen on the Rhine, and Chriemhild, sister to Gunther, king of Burgundy; the other are Gunther and Brunhild, a heroine of the fabulous North. Siegfried—as noble a hero as ever was depicted—is beloved by Chriemhild. Her brother Gunther is enamored of Brunhild of Iceland. But the northern princess can only be won by force. A successful suitor must conquer her in combat. Gunther promises Siegfried his sister's hand if he will aid him in gaining Brunhild. Siegfried, by means of a cloak which renders him invisible, is enabled to assist Gunther in his encounter with Brunhild, whom he vanquishes and marries. On the night of her nuptials, however, Brunhild has another struggle with Gunther, in which she overcomes him. Siegfried a second time reduces her to submission, and takes from her her girdle and ring, in which lay her power. These he gives to Chriemhild, who after an interval of ten years, in a quarrel with Brunhild, shows her those trophies of her defeat. Brunhild resolves on vengeance, and persuades Hagen of Tronege to murder Siegfried, which he effects with the privity of Gunther. Chriemhild, after 13 years passed in widowhood, in pursuance of a project of vengeance marries the heathen Etzel. After another interval of 13 years, in which Chriemhild gives a son to Etzel, she invites the Burgundians or Nibelungen to the court of Etzel, involves them in strife with the Huns, and after several bloody battles both parties are destroyed. Gunther

and Hagen, the sole survivors, surrender to Dietrich of Bern, an ally of Etzel, who delivers them to Chriemhild, with an injunction to spare their lives. She puts them both to death, and she in turn is killed by a vassal of Dietrich. The poem thus ends in a terrible scene of fire and bloodshed. The time in which we find the historical basis of this tragedy is about 430 or 440 A.D.; the scene is on the Rhine, and on the frontiers of Austria and Hungary. The story of the Nibelungenlied belongs to the general body of Germanic and Scandinavian mythology, and it may be traced in the myths of others of the Aryan nations. The author of the poem is not known for certain. Some have attributed it to Henry of Ofterdingen or to Klingsohr of Hungary, but recent investigations make it probable that an Austrian knight was the author (about 1140). The poem does not appear to have been so popular as some others, and after the 16th century it fell into oblivion, so remaining until 1751, when some considerable portions of it were published by Bodmer. Lachmann, in his edition of 1826, first made it the subject of scientific criticism; but his views have not been sustained by later critics. The Saint Gall text, which he regarded as a later redaction, is now considered the best, and the Nibelungenlied is regarded not as a compilation, but as an organic whole, composed by one author, who derived his materials from the rich stores of song and legend which were the common possession of the German people.

German critics speak highly of the Nibelungenlied, and prefer it in many respects to the Iliad. The language of the Iliad is, they admit, superior to that of the Nibelungenlied both as to the idiom itself and the mastership with which the Greek poet wields it, though the German epic has a childlike and venerable simplicity. On the other hand, they argue that the plan of the latter is vastly superior to that of the former. It is a great plan, from beginning to end, and embraces a whole event; the Iliad but a part of an event. The Nibelungenlied marks the culmination of the great process which had made Rome a German empire, and had transformed the invading hordes into a highly civilized people. Not only by reason of its splendid poetic and dramatic power, but also as a monument in the history of the human race, the Nibelungenlied takes rank among the great national epics of the world's literature.

**Niblack**, **Albert Parker**, American naval officer: b. Vincennes, Ind., 25 July 1859. He was graduated from the United States Naval Academy in 1880; served with an expedition of survey and exploration to Alaska in 1884-8; was inspector of naval militia in 1895-6; and writer and lecturer on signaling and naval tactics at the Naval War College in 1893-6. He was then naval attaché at Berlin, Vienna, and Rome till the Spanish-American War; during this war he served on the blockade of Spanish ports, being engaged in the battle of Nipe Bay. In 1898 he was transferred to the Philippines and took part in the suppression of the native insurrection; and in 1901 was appointed secretary of the naval commission in the Philippines. He has written '*The Coast Indians of Alaska and Northern British Columbia*' (1889).

**Niblo's Garden**, a former theatre in New York, in Broadway, near Prince Street. It was

## NICÆA — NICARAGUA

opened in 1838 under the name of the Sans Souci and a year later was a concert garden. Niblo's theatre was opened in 1839 and was demolished in 1895.

**Nicæa**, *nî-sē'a*, or **Nice**, Asia Minor, an ancient city, capital of Bithynia, on the east shore of Lake Ascania, 45 miles southeast of Byzantium, its site now occupied by the village of Isnik. As Ancore or Hellicore, it is said to have been colonized by Boeotians, and destroyed by the Mysians. Antigonus rebuilt it 316 B.C., and named it Antigonea; but Lysimachus, having conquered this part of Asia, changed its name to Nicæa, in honor of his wife Nicæa, daughter of Antipater. Under the Roman Empire it retained long an exalted rank among the eastern cities, and is renowned in ecclesiastical history for the famous councils held here in the reign of Constantine (325 A.D.); and by desire of the Empress Irene 785 A.D. In the year of the first council Nicæa was overthrown by an earthquake; it was restored by Valens in 368. After the foundation of the Latin Empire in Constantinople in 1204 the Greek Emperor Theodorus Lascaris made Nicæa the capital of his empire, which it continued to be until in 1261 the Greek emperors recovered Constantinople. It was finally taken by the Turks in 1330.

**Nicæa**, or **Nice**, **The Council of**, an ecclesiastical council held at Nicæa, in Nicomedia, in 325. Of the method of summoning the first oecumenical council Gibbon says, "The archbishop or metropolitan was empowered by the laws to summon suffragan bishops of his province, to revise their conduct, to vindicate their rights, to declare their faith, and to examine the merit of the candidates who were elected by the clergy and people to supply the vacancies of the episcopal college. The primates of Rome, Alexandria, Antioch, Carthage, and afterward Constantinople, who exercised a more ample jurisdiction, convened the numerous assembly of their dependent bishops. But the convocation of great and extraordinary synods was the prerogative of the emperor alone." Constantine before his conversion convened a council at Arles (314 A.D.). The object of the Council of Nice, likewise convened by him, was to settle the controversy which had arisen in regard to the divinity of Christ, and to contradict and condemn the views of Arius. The bishops who attended the council are variously estimated: Gibbon gives 318; Eusebius, 250; other early authorities, 300 and 320. The Eastern bishops attended in person; the Western Church was represented by seven delegates, the most important of whom was Hosius of Cordova, who attended and presided as the pope's delegate. The number of ecclesiastics of all kinds present was over 2,000. The session lasted about two months. It was frequently attended by the emperor in person. According to some accounts the earlier sittings were very stormy, and Constantine had to use much address to reconcile the disputants. Finally the council declared it to be and to have ever been the teaching of the church Catholic, in conformity with the apostolic tradition in all the churches, that Jesus Christ, the Son of God, is "consubstantial" — of the same substance or nature — with the Father: and accordingly in the creed called of Nice (otherwise the Nicæo-Constantinopolitan creed)

are the words, predicated of the son of God *consubstantialis patri*, the word consubstantial being a rendering of the Greek word of precisely the same meaning and of analogous formation, *Homoousios*.

Though the membership of the Council of Nice was, as already said, almost wholly eastern, nevertheless, its president was Hosius, who represented the western empire of Rome. Gelasius, bishop of Cæsarea, in Palestine, in his history of that council writes of the presence there of Hosius and that he was the delegate of Silvester, bishop of Rome (in the Latin version, *Silvestri episcopi maxima Roma locum obtinebat*); and naturally enough Hosius' name is the first among the signatures of the bishops to the Council's decrees. See COUNCIL.

**Nicander**, *nî-kân'dér*, Greek physician and poet of the 2d century B.C. He was born in Claros, near Colophon, in Ionia; was hereditary priest of Apollo in his native city; and may have spent part of his life in Italy. He wrote various didactic poems now lost; one of these was Virgil's model for the 'Georgics,' and another the 'Heterocœmena' or 'Transformations,' suggested Ovid's 'Metamorphoses.' 'Theriaca,' on dangerous wild animals, and 'Alexipharmaca' on antidotes, his two extant works, were edited by Schneider (1816 and 1792).

**Nicaragua**, *nîk-ä-rä'gwä*, or *nē-kä-rä-gwä*, Republic of, a country of Central America, bounded on the north by Honduras, on the east by the Caribbean Sea, on the south by Costa Rica, and on the southwest and west by the Pacific Ocean. Its area, according to conservative estimates, was formerly given as 40,000 square miles; including Mosquitia (see next paragraph) it is approximately 49,000 square miles.

**Political Divisions.**—The departments enumerated in the presidential decree of 12 Dec. 1902 were: León, Granada, Managua, Chinandega, Rivas, Masaya, Matagalpa, Carazo, Jinotega, New Segovia, Chontales, and Yelaya — the last including, for the purposes of that decree, the territories of Cape Gracias á Dios and San Juan del Norte. The strip of Caribbean coast now called Yelaya was formerly the Mosquito Reserve, or Mosquitia, a British protectorate; but Great Britain has gradually withdrawn in Nicaragua's favor her claim to exercise jurisdiction there. This eastern coast is now regarded as one of the most valuable parts of the republic; it contains gold mines, its fruit industry is already profitable, large plantations of rubber trees are being cultivated, and rosewood, cedar, and mahogany are taken from its forests.

**Physical Geography.**—The Sierra de los Morabios, running from the Gulf of Fonseca to the western shore of Lake Managua, appears to be the centre of volcanic energy in Nicaragua. It has the following vents: Cosigüina (famous on account of the terrific explosion of 2 Jan. 1835), Chonco, El Viejo (quiet since 1684), Santa Clara, Telica, San Jacinto, Rota, Las Pilas (eruption in 1850), Asososca, and Momotombo (eruptions in 1870 and 1886); and though only two of these may be described as active, the others are dormant, rather than extinct. This ridge is near the Pacific coast, and its southeasterly trend is continued by the isolated volcanoes Masaya (active), Apoyo (extinct),

## NICARAGUA

Mombacho, Ometepe, and Madera (extinct). The two last are on an island near the western shore of Lake Nicaragua, and but a few miles from the nearest point in Costa Rica. In other words, practically the entire Pacific coast range is intensely volcanic; the only exception being found at Brito and the neighborhood southwest and south of Ometepe and Madera, where, according to the views of some geologists, the "internal fissure in the earth's crust that gave rise to the several volcanic vents of Central America" is "completely built up and healed. Hence the low gap in the grand American cordillera found at that place, which has a mean height of about 150 feet above sea-level, the lowest gap from Alaska to Tierra del Fuego." Through this gap, over this "healed fissure," the Nicaragua Canal was to have been cut. The volcanic characteristics are not found far inland, but are restricted almost entirely to the western border; nevertheless the principal cities are built in this narrow strip of land between the Pacific and the lakes. Chinandega, near the coast in the northwest, has 20,000 inhabitants; León, 45,000; Managua, capital of the republic, 30,000; Masaya, 20,000; and Granada, on the west shore of Lake Nicaragua, 25,000. Of these the largest and most beautiful city, León, contains the cathedral of St. Peter which, it is said, was built at a cost of \$5,000,000 when labor was valued at 25 cents a day. From the roof of this great church can be seen in one view 13 volcanoes. In the central region the largest town is Matagalpa (4,000). The western strip, despite its insecurity and oppressive climate, has been preferred as a place of residence by the majority of the Nicaraguans on account of its facilities for communication and transportation—among which are to be reckoned the great lakes, Nicaragua (over 100 miles long) and Managua (about 35 miles), connected by a river which could, without difficulty, be rendered navigable. The greater part of the republic, stretching eastward from the lakes to the department of Zelaya, is of a different geologic formation. It is covered with a chain of mountains of moderate height, and transverse spurs which are not volcanic extrusions but Antillean folds (see CENTRAL AMERICA). Many parts of the central uplands are comparatively cool and well watered, with very rich soil and nearly untouched treasures in forest and mine; but they have remained undeveloped hitherto chiefly on account of the lack of good roads. The earthquake shocks of Nicaragua are less severe than those of Guatemala and Salvador, and dangerous fevers prevail chiefly, though not exclusively, in the lowlands or near stagnant water. The large rivers, rising in the central mountains and emptying into the Caribbean Sea, are the Segovia, also called Coca or Wanks, which forms the boundary with Honduras, the Grande, the Kurringwas, and the Bluefields, near whose mouth is the town of Bluefields (pop. about 2,000). The San Juan flows from Lake Nicaragua to the Caribbean, and in part forms the boundary with Costa Rica on the south. The route of the Caribbean section of the canal, for which the waters of the San Juan would have been utilized, included a cut through Costa Rican territory west of Ochoa.

**Mineral Resources.**—Among the Central American republics, Nicaragua ranks second (Honduras being first) in respect to mineral

wealth. Gold and silver are found in the departments of New Segovia, Chontales, Zelaya, León, Matagalpa, and Jinotega; copper in León, New Segovia, and Matagalpa; lead and iron in New Segovia and Matagalpa; mercury, salt, sulphate of lime, sulphur, and combustible minerals in León; tin in New Segovia; nickel and zinc in Matagalpa. Up to 1903 only gold mines, or those in which gold was found mixed with silver, were worked. The principal investors were citizens of the United States.

**Forests, Agriculture, and Fauna.**—The forests produce rubber, mahogany, ebony, cedar, quebracho, light rosewood, mora, brazilwood, vanilla, sarsaparilla, vegetable wax, ipecacuanha, quinquina, copaiba balsam, rhubarb, etc. In many parts of the republic—near both coasts, in the valleys, on the slopes and plateaus near the lakes and rivers—soils of exceptional value for agricultural purposes are found; and though the system of cultivation is rudimentary, extraordinary results are sometimes achieved. Thus, it is said on good authority that sugarcane produces at least two annual crops, and sometimes three; cotton planted in October is picked the following February on all the western lands; the virgin soil of the eastern slope yields four crops of maize in a year; and indigo can be cut three times before replanting becomes necessary. Coffee thrives best at elevations between 2,000 and 3,000 feet above sea-level. Rice produces abundantly on central and eastern slopes. The systematic cultivation of rubber has been undertaken recently. Bananas are grown in the west, principally in the departments of León and Managua, for home consumption; in the east, on a large scale, for export. The annual yield of cacao is insufficient to supply the local demand; in quality, however, it is so excellent that it brings a higher price in the home market than the imported chocolates. Tobacco and aguardiente (made from sugarcane) are government monopolies. A large number of the coffee estates are controlled by Germans. The fauna includes the puma, deer, jaguar, monkeys, alligators, armadillos, ant-eaters, guatuso, peccaries or wild hogs, and many species of reptiles. There are large herds of cattle. Prominent among avifauna are macaws, parrots, buzzards, wild turkeys, and humming-birds.

**Commerce.**—Exports consist principally of coffee, rubber, bananas, coined silver, coined gold and gold in bars, gold ore and amalgam, hides, sugar, buckskin, and fine woods. Imports are: cotton goods and other tissues, firearms, provisions (dried, salted, or canned), glassware, window-glass, candles, matches, iron and steel in various forms, nails, machetes, crockery and chinaware, furniture, paints, musical instruments, agricultural implements and tools for workshops and domestic use, tanned hides, lamps, wines and liquors, and art objects. Shipments of gold in 1908 amounted to \$933,171. The total foreign commerce for 1909, as shown by the records of the minister of the treasury, was: exports, \$3,600,000, and imports, \$3,500,000. The amount of foreign merchandise imported into Nicaragua during 1902 was less in quantity and value than in any of the previous 10 years, the decline being noticed especially in the amount of British trade. Exports to the United States in the year ending 30 June 1909 were valued at \$1,900,000; imports from the United States for

the same period, \$1,300,000. An analysis of the foreign trade for 1901 shows percentages of exports and imports, as follows: Exports to the United States, 60 per cent, and imports from the United States, 59 per cent; to Germany, 14 per cent, and from Germany, 7 per cent; to Great Britain, 9 per cent, and from Great Britain, 20 per cent; to France, 8 per cent, and from France, 8 per cent.

*Shipping, Railways, Roads, etc.*—Corinto, the principal western port, has the advantage of the Pacific coast lines of steamships, American, Chilean, British, and German. Bluefields, on the eastern coast, has regular communication with the United States by means of the vessels of New Orleans and Mobile steamship companies. In November 1902 the Central Division of Nicaragua's railway system was practically completed. There is now a continuous line from the port of Corinto to Granada, and several branch lines are projected. The total system in operation is 160 miles long. In 1901 an American syndicate undertook the construction of cart roads to supply communication with Matagalpa, New Segovia, and other points in the interior; a concession was also granted to a citizen of the United States for a line of railway to connect Matagalpa with the head of navigation on the Rio Grange. There are in operation about 3,637 miles of telegraph lines. The number of post-offices was 135 in 1910.

*Weights, Measures, and Money.*—The metric system of weights and measures is in use. The unit of value is the silver *peso*, worth \$0.384 in U. S. currency. The note circulation amounted to little more than \$1,000,000 in 1900.

*Government.*—The presidential term is 4 years; but Gen. Zelaya, who was first elected as a result of the civil war of 1893, retained office continuously, and was in power during the term 1902-6. Constitutionally, the president shares authority with the legislature (a single house, consisting of 40 representatives elected for two years by universal suffrage), and the judiciary (supreme court of justice, two courts of appeals, and inferior tribunals); in practice, however, authorities that should be coordinate may be subordinated by an irresponsible executive (see *DICTATORSHIPS IN LATIN-AMERICA*). The secretaries or ministers are chiefs of the departments of Foreign Affairs and Public Instruction; War and Marine; Treasury; Public Works; and Interior, Justice, and Police.

*Finances.*—The revenue of the nation from January to September, 1902, amounted to 4,472,375 pesos, and authorized expenditures to 4,803,736 pesos, according to Pres. Zelaya's statement. In 1900 and 1901 public revenues exceeded public expenditure. The main sources of income are customs duties and the tax on liquor and tobacco; the largest expenditures in 1900 were for the ministry of war and marine. The foreign debt is approximately \$1,350,000; in the interior in 1902 the government owed \$12,000,000, "money of the country."

*Population, Ethnology, and Education.*—The number of inhabitants, formerly given as 360,000, is now estimated at 500,000, including Indians of Mosquitia and uncivilized natives of the interior. A very large proportion are descendants of the aborigines, and there is an admixture of African blood, especially in the east, but the white element is increasing. Though the

population of Nicaragua is so much greater than that of Costa Rica, it has nevertheless a smaller number of schools. Costa Rica has twice as many teachers in her schools as soldiers in her army; Nicaragua, three times as many soldiers in her army as teachers in her schools. Instruction in the higher branches is given at two universities and ten colleges.

*History.*—(For some of the main events, see *DISCOVERIES, CENTRAL AMERICA, and ISTHMIAN CANALS*). On 21 Jan. 1522 Gil Gonzalez Dávila with four vessels sailed westward from Panama in search of the Spice Islands. Proceeding along the Pacific coast, after many mishaps, he reached the home of an Indian chief whose name was Nicaragua, and converted him to Christianity. On the same day 9,017 natives, if we may believe the commander's assertion, accepted baptism. Nicaragua's town stood on the shore of the lake to which his name has been given. Gil Gonzalez heard from the pilots he had with him that, by way of the lake and river, there was easy communication between the "North Sea" and the "South Sea"; and he wrote that only "2 or 3 leagues of very level road" separated the ocean from the lake. Until 1718 the isthmus, including the province of Nicaragua, was subject to the viceroy of Peru; after that to the Spanish representative at Bogotá. New Granada (Colombia) continued to claim certain rights in the entire isthmian territory, even up to Cape Gracias á Dios. The most interesting period is that in which occurred the invasion and temporary conquest of Nicaragua by William Walker, of Nashville, Tenn., with his 56 "emigrants." Walker became virtually dictator in 1856. His aim, disclosed to one of his associates, was to found an empire embracing Central America and Mexico (see *Bibliography*). In 1895 the short-lived "Greater Republic of Central America" was formed by the association of Nicaragua with Salvador and Honduras. It could hardly be called a genuine union.

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**Nicaragua, Lake,** in the republic of the same name, is situated in the southwest of Nicaragua, 110 feet above the Pacific Ocean, from which it is separated by a strip of land 12 miles wide. It is over 100 miles long from northwest to southeast, has a mean breadth of 30 miles and a maximum of 40 miles, and ranges from 50 feet to 200 feet deep. It receives the waters of Lake Managua to the northwest by the Tipitapa River, and discharges by the San Juan River into the Caribbean Sea. There are numerous islands in the lake, the largest being Ometepe, noted for its two active volcanoes. There is steamer traffic, the lake forming a link in the route across the isthmus of Central America. See *CANALS and NICARAGUA* for the



## NICARAGUA WOOD—NICENE CREED

projected interoceanic waterway via Lake Nicaragua.

**Nicaragua Wood**, a bright-red dye-wood native to Nicaragua, and a species of *Casalpinia*. It resembles Brazil wood botanically and in its properties, but yields a smaller amount of coloring matter.

**Nica'tor.** See **DEMETRIUS II.**

**Niccolini, Giovanni Battista**, jō-vān'nē bāt-tēs'tā nēk-kō-lē'nē, Italian dramatist: b. San Giuliano, near Pisa, 31 Oct. 1782; d. Florence 20 Sept. 1861. He studied at the University of Pisa; published his first poem in 1804; and became in 1807 professor of history and mythology in the Academy of Fine Arts in Florence. His chief writings are his patriotic tragedies and his lyric verse. Among the former are: 'Nabucco' (1819); 'Antonio Foscarini' (1827); 'Giovanni da Bocida' (1830), and 'Arnoldo da Brescia' (1843), the last a bitter attack on the Guelph party. Niccolini wrote also some volumes of criticism. The best collected edition is by Garigiulli (1862 et seq.). Consult the biography and critique by Vanucci (1866).

**Nic'colite**, a native arsenide of nickel, having the chemical formula NiAs. The crystals, when found, belong to the hexagonal system; but the mineral usually occurs massive. It is reddish in color, and opaque with a metallic lustre. It has a hardness of from 5 to 5.5, and a specific gravity of from 7.3 to 7.7. Niccolite occurs in Saxony, Sweden, Cornwall, Scotland, Chile, and the Argentine Republic. In North America it is found at Chatham, Conn., at Franklin Furnace, N. J., at Silver Cliff, Colo., and at Tilt Cove, Newfoundland. (Also known as "Kupfernickel," "false copper," or "devil's copper.")

**Nic'cols, Samuel Jack**, American Presbyterian clergyman: b. Greenfield Farm, Westmoreland County, Pa., 3 Aug. 1838. He was graduated from Jefferson College in 1857; studied theology at Western Theological Seminary, and was ordained to the Presbyterian ministry in 1860. He was subsequently pastor at Chambersburg, Pa., and chaplain of the 126th Pennsylvania volunteers in 1862, and in 1863 became pastor of the 2d Presbyterian Church, St. Louis. He was moderator of the Presbyterian General Assembly in 1872, and has published 'Women's Position in the Church,' 'The Eastern Question in Prophecy.'

**Niccolo** (nēk'kō-lō) of **Arezzo**, ā-rēt'sō, Italian painter: b. Arezzo 1350; d. 1417. He worked on the sculpture of the cathedral at Florence, and executed two statues for the campanile (1383). His relief of the Virgin in the façade of the Santa Maria della Misericordia is remarkable for a freedom and elegance which point to a distinct advance in Italian sculpture.

**Niccolò de' Niccolì**, dā nēk'kō-lē, Italian humanist: b. Florence 1363; d. there 23 June 1437. He rendered literature most important service by ransacking Europe for manuscripts of the principal Greek and Latin works. At his death he presented to the public his library, which became the basis of the Marcian library, one of the most famous of Italy. Niccolò copied and corrected numerous MSS. with his own

hand, and thus came to be regarded as the originator of textual criticism of the ancient authors.

**Nice**, nī'kē, a Greek goddess. See **NIKE**.

**Nice**, nēs, Asia Minor. See **NICÆA**.

**Nice**, France, a city, seaport, and health resort, capital of the department of the Alpes Maritimes, beautifully situated near the base of the Maritime Alps, on the Mediterranean, and on both sides of the Pailon or Paglione, a mountain torrent of short and rapid course, 140 miles east by north of Marseilles. It is divided into the Old Town, on the left bank of the Paglione, and the New Town, on the right. Both quarters, but more especially the New Town, have of late years been much extended. The streets of the former are mean-looking compared with those of the latter, in which there are wide streets and boulevards, and lofty and handsome houses. The quays that border the Paglione are lined with gay shops, and between these and the sea the stream is entirely covered over, leaving a wide space or square where is a handsome public casino, with a fine winter-garden, and another square adorned by a statue of Masséna in bronze. At the mouth of the stream there is a public garden, and westward along the sea-front a fine promenade bordered with handsome hotels and villas. On a pier or jetty projecting from the public garden is a fine new casino. There are no remarkable public buildings in the city. There are places of worship for English, Scotch, Germans, Russians, and Americans, natural history museum, observatory, several theatres, public library, etc. Nice possesses some silk, cotton, and paper mills; many oil-mills, and manufactories of leather, soap, liqueurs, essences, perfumery, etc. Immense quantities of flowers are grown. The harbor or port is separated from the rest of the town by the Castle Hill (320 feet), which has been laid out into beautiful grounds commanding magnificent views and crowned by the remains of an old castle. The harbor has recently been greatly improved, but it is not deep enough for the largest class of steamers. The exports by sea consist principally of olive-oil. Nice is much resorted to in winter by foreigners, particularly English. Owing to sudden changes of temperature, its climate is unsuitable for those laboring under pulmonary and bronchial complaints. Pop. about 130,000. The ancient Ligurian town of Nicæa, founded by a colony of Phœceans from Massalia (Marseilles), became subject to Rome in the 2d century B.C. It was in the hands of the Saracens during the greater part of the 10th century. Then, after existing as an independent city, it acknowledged the supremacy of the Counts of Provence and the House of Savoy (1388). In 1543 it was taken and pillaged by the Turks. Later, from 1600 onward, it was repeatedly taken by the French; and they kept possession of it from 1792 to 1814. In 1860 it was ceded to France by Sardinia (Savoy). Masséna was born near the city, and Garibaldi in it. Consult: Moris, 'Nice' (1899); Nash, 'Guide to Nice' (1884).

**Nice, Councils of.** See **NICÆA, COUNCILS OF.**

**Nicene** (nī'sēn) **Creed**, a somewhat detailed statement of Christian doctrine used

## NICEPHORUS — NICHOLAS

in their liturgies by the Roman Catholic, Oriental and Anglican Churches. The first part was formulated at the Council of Nice (q.v.). The final clauses after "And I believe in the Holy Ghost" were added at the Council of Constantinople 381. See CREEDS; FILIOQUE; ARIUS.

**Nicephorus**, nī-sēf'ō-rīs, Greek historian: b. 758; d. 829. He is generally known as Nicephorus Constantinopolitanus, was secretary to the Empress Irene, and in 806 was elected patriarch of Constantinople. The violent emperor Leo V. deposed him, and he retired to a cloister in 805. To this retirement we owe his invaluable 'Chronologia Compendiaria' and 'Breviarium Historicum.'

**Nicephorus I.**, Byzantine emperor of the first decade of the 9th century A.D.; d. 26 July 811. He is often called "Logothetes," this being his title as financial secretary to Irene, whom he succeeded on the throne October 802, thanks to a sudden revolution. His experience in finance led him to lay heavy taxes, and he sided with the iconoclastic party. These two courses won him unpopularity, which was increased by his unsuccessful foreign administration; in 803 he gave up nearly all Italy to Charlemagne; in 806 was forced to sign a humiliating peace with the Arabs; and in 811 was defeated and killed by the Bulgarians under Khan Krum.

**Nicephorus II.**, Phocas, Byzantine emperor: b. 912; d. 10 Dec. 969. He was of Capadocian descent, and, like his father, Bardas Phocas, proved himself a great general. During the reigns of Constantine VII. and Romanus II. he fought the Arabs in Asia and southern Italy, and in 961 recaptured the island of Crete from the Saracens. In 963 he returned to Constantinople after the death of Romanus II., was proclaimed emperor 16 August, and 20 September married Romanus' widow, Theophano. As emperor Nicephorus' military career was no less brilliant than before; he renewed the war against the Arabs, won all of Cilicia, and in 969 captured Antioch; and was equally successful against the Bulgarians and Macedonians. At home his heavy taxes to carry on these campaigns and his bold tampering with ecclesiastical funds aroused monks and people against him. He was assassinated by his wife's paramour and his own kinsman and general, John Tzimiskes. Nicephorus was not only a general but a statesman and diplomat; witness his work 'Legatio,' edited by Pertz (1839). Consult Schlumberger, 'Nicephore Phocas' (1890).

**Nicephorus III.**, Botaniates, Byzantine emperor of the 11th century. He was a general, who had grown old in the service, when in 1078 he successfully plotted against Michael VII. and became emperor. His reign of three years was filled with contention against his rivals at home and with Robert Guiscard abroad. He was forced to abdicate in favor of Alexis Comnenus in April 1081, and spent the rest of his life in a monastery.

**Nicetas Acominatus**, nī-sē'tas ā-kōm-i-nā-tūs, Byzantine historian: b. Chonæ (hence called CHONIATES) in the middle of the 12th century; d. Nicæa 1216. He was a resident and official of Constantinople up to 1204, when the city was captured and he removed to Nicæa. His excellent history of the Byzantine Empire

from 1118 to 1206, completing Zonaras, is his most important work; it is edited by Bekker (1835).

**Nichiren**, nīch'i-rēn, Japanese religious reformer: b. 1222 A.D.; d. 1282. He founded a Buddhist sect, the Nichvien-shū. He appears to have been a fanatic religionist, and to have quarreled bitterly with other sects. Two exiles were imposed upon him for his disturbances. The central doctrine of his teaching is that all life may attain to being a Buddha by repeated transmigrations. Final salvation is reached by prayer and obedience to the law. Nichiren is revered, but not worshipped, by his followers, whose chief shrines are at Ikegami, near Tokyo.

**Nichol**, nīk'ōl, John, Scottish lecturer and author: b. Montrose, Forfarshire, Scotland, 8 Sept. 1833; d. London 11 Oct. 1894. He was educated at Glasgow University and Balliol College, Oxford, being graduated with honor from the latter in 1859. From 1862 to 1889 he was professor of English literature in Glasgow University, and later lectured widely in England and Scotland on literary subjects. He visited the United States several times, and during the Civil War warmly supported the Northern cause. He prepared the article on 'American Literature' for the 'Encyclopædia Britannica,' which has been separately published; and also wrote 'Fragments of Criticism' (1860); 'Hannibal' (1872), a dramatic poem; 'Tables of European Literature and History' (1876); 'Byron' in the 'English Men of Letters' series (1880); 'Robert Burns' (1882); 'Francis Bacon, his Life and Philosophy' in 'Philosophic Classics for English Readers' (1888-9); 'Kant' (1889); and 'Carlyle' in the 'English Men of Letters' series (1892). Consult his 'Memoir' by Knight (1896).

**Nichol, John Pringle**, Scottish astronomer: b. Brechin, Forfarshire, 13 Jan. 1804; d. near Rothesay 19 Sept. 1859. Originally educated for the Scottish Church, he turned his attention to astronomy, and in 1836 was appointed professor of astronomy in Glasgow University, a post which he retained with great credit till his death. Among his works may be mentioned 'The Architecture of the Heavens' (1838); 'Contemplations on the Solar System' (1838); 'The Planet Neptune, an Exposition and History' (1848); 'The Stellar Universe' (1848); and the 'Planetary System' (1851). These have the merit of being written in a very attractive and interesting style, and obtained a wide popularity. He likewise edited a 'Cyclopædia of Physical Sciences' (1857).

**Nicholas**, nīk'ō-las, a proselyte of Antioch, one of the seven deacons (Acts vi. 5). He is sometimes charged, though on insufficient evidence, with founding the sect of Nicolaitans alluded to in Rev. ii. 15.

**Nicholas, Saint, of Myra**, one of the chief saints of the Greek Church, called the "Wonder-Worker" and venerated by the Roman Catholic Church: b. Patara, province of Lycia, toward the end of the 3d century; d. Myra 6 Dec. 342. He was a bishop of Myra, imprisoned during the Diocletian persecution, and set at liberty by Constantine the Great. He is venerated in the East and West as a saint and miracle worker, the patron of little children, unwedded

## NICHOLAS

maidens and sailors. In 1087 his body was translated and arrived in his native city of Patara amid great rejoicings, 9 May. His festival, the anniversary day of his death, is still kept with special ceremonies in Germany, Switzerland and the Low Countries. He is the original of the Christmas present-bringer, "Santa Claus." Consult: Praxmarer, 'Der Heilige Nikolaus und seine Verehrung' (1894).

**Nicholas**, the name of five popes, as follows:

**Nicholas I., Saint:** b. Rome; d. there 867. He succeeded Benedict III., in 858. He was of a resolute disposition and successfully upheld the papal authority. He excommunicated Photius, patriarch of Constantinople who had usurped that see after the deposition of Ignatius by the emperor Michael III. Consult: Lämmer, 'Papst Nikolaus I. und die byzantinische Staatskirche seiner Zeit' (1857); Leroy, 'Saint Nicholas I.' (1898); Ray, 'Nicholas I.' (1901).

**Nicholas II. (GERHARD, gēr'härt, Fr. zhārār):** b. Burgundy; d. Florence 19 July 1061. A canon of Liège he became bishop of Florence in 1046 and succeeded Stephen X. in the papal chair in 1059. He was opposed by a rival, called Benedict X., the choice of some of the Roman nobles, but being disavowed by the council of Satri, Benedict was obliged to forego his claim. Hildebrand was the counsellor of Nicholas throughout his pontificate, and through his direction a council was assembled at Rome in 1059 which restricted the papal election to the college of cardinals.

**Nicholas III. (GIOVANNI GAETANO DEGLI ORSINI, jō-vān'nē gā-ā-tā'nō dā'glē ōr sē'nē):** d. 1280. He came of a noble Italian family and in 1277 was elected in succession to John XXI. From the emperor, Rudolph of Hapsburg, he succeeded in obtaining the cession of Romagna and the exarchate of Ravenna and he deprived Charles d'Anjou, king of Naples, of the vicariate of Tuscany. He was succeeded by Martin IV.

**Nicholas IV. (GERONIMO, jā-rō-nē'mō):** b. Ascoli, Italy; d. 1292. While very young he entered the order of Saint Francis and in 1274 became its general. He was made a cardinal by Nicholas III., and bishop of Palestrina by Martin IV. and in 1288 was elected pope. He was the first Franciscan pontiff. He excommunicated James of Aragon and his followers in Sicily and promoted the claims of Charles II. of Anjou to that kingdom. His unsuccessful efforts to excite a new crusade are supposed to have hastened his death.

**Nicholas V. (TOMMASO PARENTUCELLI, tōm-mā'sō pā-rēn-too-chē'lē):** b. probably at Sarzana, near Pisa, 1397; d. 1455. He was the cardinal-bishop of Bologna and succeeded Eugenius IV. in 1447. He was one of the most learned men of his time, collected books and manuscripts, and ordered translations to be made of the Greek classics. The Vatican library was also founded by him, and he embellished Rome with numerous fine edifices. In 1328 the name of Nicholas V. was assumed by Peter de Corbario, a Franciscan whom Louis of Bavaria set up as antipope against John XXII. This ecclesiastic, however, soon made his submission, and died in 1333.

**Nicholas I. Pavlovitch, czar of Russia:** b. near St. Petersburg 6 July (25 June) 1796; d. St.

Petersburg 2 March 1855. He was third son of Paul I. The crown was relinquished by his elder brother, Constantine, and on 24 Dec. 1825 he entered upon his reign and 3 Sept. 1826 was crowned at Moscow. On 26 Dec. 1825 the military conspiracy of the Dekabrists, which had been for several years in operation, broke out. Nicholas suppressed this revolt with great energy and personal courage; but the ultimate result was to arouse a policy of strong autocracy, based largely on the army, and bent on strictly maintaining internal peace. The civil administration was placed under military supervision; and the laws subsequently promulgated for the relief of serfdom were largely ineffective. Nicholas' foreign policy was aggressive. A war with Persia (1827-8) was concluded by a peace which gave Russia an important increase in territory; and one with Turkey (1828-9) by the peace of Adrianople which secured to Russia the eastern coast of the Black Sea, and brought about the establishment of the Grecian kingdom. In 1849 Nicholas aided Austria in the conquest of the Hungarian revolutionists. His attitude toward Turkey brought on the unfortunate Crimean war. In 1853 he demanded the protectorate over Turkish subjects of Greek religion, but the Sultan refused, and was supported by England and France. The Russian army proved to be unprepared, and was defeated at the Alma and Inkerman. Nicholas died before the end of the contest (see CRIMEAN WAR). During his reign conformity to the Orthodox Greek Church was imposed. He was probably the most prominent sovereign of his time and in many ways a rather majestic despot. Consult: Smucker, 'Nicholas I.' (1860); Lacroix, 'Histoire de la Vie et du Règne de Nicholas I.' (1864-75); Edwards, 'The Romanoffs' (1890).

**Nicholas II., czar of Russia:** b. St. Petersburg 18 May 1868. He was the eldest son of Alexander III. by his wife, the Danish princess Dagmar, known as czarina by the name Maria Feodorovna. His education under General Danilovitch was military; it was concluded by a trip through the East, in 1891, during which he was nearly killed by a sabre stroke from a Japanese fanatic. His father's death 1 Nov. 1894 brought him (much against his will) to the throne; he married Princess Alice of Hesse 26 Nov. 1894; and in May 1896 was crowned with great pomp at St. Petersburg. His policy he proclaimed would be the peaceful one of his father, and this is certainly proved true as regards his relations with the European powers. His visits to Vienna, Breslau, and Paris in 1896, and the visits paid him in return in 1897 by the Emperor of Austria, by William II. of Germany, and by President Faure of France have shown his willingness and the eagerness of Austria, Germany, and France that there be a peaceful European policy. Even more striking was the Czar's note to the powers, published by Count Muravieff 24 Aug. 1898, inviting them to a Peace Congress, looking to the disarmament of the Powers. The Hague Congress in 1899 was followed by another visit to Paris by the Czar 18-21 Sept. 1901 and by President Loubet's trip to St. Petersburg 20-23 May 1902, and by a Franco-Russian convention intended to offset the Anglo-Japanese entente.

Upon his accession, Nicholas II. was hailed as a liberal, if not a radical. Whether there has

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been internal reform during his administration is uncertain; even the rescript in favor of religious freedom seems a doubtful reform in the eyes of some critics, who urged that although freedom is granted to all present sects the death penalty still holds for any Greek churchman who leaves the Orthodox faith for any other. How far the Emperor is personally responsible for the acts of his government is also doubtful; he is often described as the mere tool of his narrow procurator-general, Pobiedonostyeff, and sometimes as a prey to morbid melancholia and the dupe of spiritualists and quacks. The measures taken to Russianize Finland, and the slack treatment of those guilty of the Kishineff massacres, seem—to say the least—unlike the Czar as he was pictured at his accession. Consult: Ukhtomsky's description of the trip through the Orient (English 1896-1900), Notovitch, 'L'Empereur Nicolas II. et la Politique Russe' (1895), and Leudet, 'Nicolas II. intime' (1899).

**Nicholas I. Petrovitch Njogoosh**, prince of Montenegro: b. 7 Oct. 1841. He succeeded his uncle, Prince Danilo, 14 Aug. 1860. In 1862 he undertook a war against Turkey which ended in an unfavorable peace 13 September; but most of the more burdensome conditions were removed by the Powers, and his partial independence was recognized. In 1876-8 with the aid of Russia, which supplied to him provisions, money, and munitions, he waged a second and successful war against Turkey; and at the Berlin Congress he obtained a large increase in the area of his dominion and the recognition of his independent sovereignty. He gave the state a sort of constitution. He wrote several dramas and other verse.

**Nicholas, Sir Edward**, English secretary of state: b. Wiltshire, England, 4 April 1593; d. East Horsley, Surrey, England, 1 Sept. 1669. He was graduated from Queen's College, Oxford, in 1611, and in 1627-8 he was a member of Parliament. In 1641 he became secretary of state under Charles I. and nominally remained in that office until the king's execution. Upon the restoration of Charles II. in 1660 he resumed his former office, from which age compelled his resignation in 1662.

**Nicholas, Wilson Cary**, American soldier and legislator: b. Hanover, Va., about 1757; d. Milton, Va., 10 Oct. 1820. In 1774 he was graduated from William and Mary College, and at the beginning of the Revolutionary War joined the Continental army. He became officer in command of Washington's life guards and served in this position till 1783. He was a member of the Virginia State Convention which ratified the Constitution of the United States, and was one of those who favored ratification. In 1799 he became United States Senator, and in 1804 resigned from the Senate to become collector of the ports of Norfolk and Portsmouth. In 1807 he was elected to Congress, serving till 1814, and in the latter year was elected governor of Virginia for two years. He was one of the most influential supporters of Thomas Jefferson.

**Nicholas of Clémanges**. See CLÉMANGES, MATHEU NICOLAS.

**Nicholas of Cusa**. See CUSA.

**Nicholas of Lyra**, l'ra, called "Doctor Planus et Utilis," mediaeval French monk and Biblical scholar: b. Lyre, Normandy; d. Paris

23 Oct. 1340. He entered the Franciscan order in 1291, became an instructor in theology; and later provincial of his order in Burgundy. His Hebraic and rabbinical learning was profound. His chief work is the 'Postillæ Perpetuæ' (1471-2), a running commentary on the Scriptures, which, on account of his linguistic knowledge, is on a much sounder basis than similar works of the period. It was much used by Luther; but can hardly be justly credited with the influence once ascribed to it in the time:

"Si Lyra non lyrasset,  
Lutherus non saltasset."

(If Lyra had not played, Luther would not have danced).

**Nicholas Nickleby**, nīk'l-bī, a well known novel by Charles Dickens which appeared serially in 1838 and 1839. It contains in Dotheboys Hall a realistic description of the condition of cheap boarding schools of that period, and the author's strictures accomplished not a little toward reform in this direction.

**Nicholasville**, nīk'ō-lās-vīl, Ky., city, county-seat of Jessamine County; on the Cincinnati, N. O. & T. P., the Louisville & N., and the Louisville & A. R.R.'s; about 10 miles south by west of Lexington and 70 miles east by south of Louisville. It was settled in 1799 and in 1835 was incorporated. It is the commercial centre of a productive agricultural region, in which tobacco is one of the chief crops, and considerable attention is given to horse-breeding. It has flour and lumber mills, tobacco storage plants, and wheel works. The Jessamine Female Institute, opened in 1854, is located here. Pop. 2,600.

**Nicholls**, nīk'ōlz, Charlotte. See BRONTË, CHARLOTTE.

**Nicholls, Francis Tillon**, American lawyer: b. Donaldsonville, Ascension Parish, La., 20 Aug. 1834; d. Jan. 1912. He was graduated from West Point in 1855, and in 1856 served in the campaign against the Seminole Indians. He then resigned his commission in the army to study law, and was admitted to the bar in 1858, beginning his practice in Napoleonville. In 1861 he entered the Confederate army as captain, and was promoted lieutenant-colonel in the same year, and brigadier-general in 1862. He had charge of the defenses of Lynchburg, Va., and in 1864 was superintendent of the trans-Mississippi conscript bureau. After the war he resumed his law practice in Ascension Parish, La., and later removed to New Orleans (1880). In 1876 he was the Democratic candidate for governor, his party claimed the election by about 8,000 votes, but a Republican returning board declared his opponent elected. He, however, took his seat, and was subsequently recognized as governor by the Federal government. In 1888 he was again elected governor, and during his administration actively opposed the Louisiana Lottery Company, and vetoed the bill granting it a new charter with increased privileges. In 1893 he became chief justice of the Louisiana State supreme court.

**Nichols, Edward Tatnall**, American naval officer: b. Augusta, Ga., 1 March 1823; d. Pomfret, Conn., 12 Oct. 1886. He studied at the United States Naval Academy, became commander in 1862, in the Civil War commanded the Winona of the West Gulf squadron, and re-

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ceived the surrender of Fort St. Philip 28 April 1862. In the passage of the Vicksburg batteries, also, he distinguished himself. In 1878 he reached the grade of rear-admiral, and in 1885 was retired.

**Nichols, George Ward**, American writer: b. Mount Desert, Maine, 21 June 1837; d. Cincinnati, Ohio, 15 Sept. 1885. He was art critic on the *New York Evening Post* under William Cullen Bryant, and was aide-de-camp to General Sherman in the Civil War. He was president of the Cincinnati College of Music for several years and greatly improved its educational and financial standing. He wrote: 'The Story of a Great March' (1865); 'Art Education Applied to Industry' (1877); 'Pottery' (1878); etc.

**Nichols, Henry Ezra**, American naval officer: b. New York; d. off Paranaque, Philippine Islands, 10 June 1899. He was graduated from the United States Naval Academy in 1865 and served in the navy with steady promotion. He was engaged on the Coast Survey in 1876-7 and in 1880-4, and in 1897 took command of the Bennington, which became one of Admiral Dewey's fleet in 1898. In 1899 he was transferred to the command of the monitor Monadnock and rendered valuable assistance at the capture of Paranaque. Captain Nichols was overcome by the heat during the bombardment and died while his ship was still in action.

**Nichols, William Ford**, American Protestant Episcopal bishop: b. Lloyd, N. Y., 9 June 1849. He was graduated from Trinity College, Hartford, Conn., in 1870, and from the Berkeley Divinity School, Middletown, Conn., in 1873. He entered the priesthood the next year and was successively rector of churches at West Hartford, Conn.; Newton, Conn.; Christ Church, Hartford (1877-87); and St. James, Philadelphia (1887-90). He declined the bishop-coadjutorship of Ohio in 1888, but in 1890 was consecrated bishop-coadjutor of California, becoming bishop of that diocese in 1893.

**Nicholson, nīk'ōl-sōn, Sir Francis**, English colonial governor: b. England 1660; d. London 5 March 1728. In 1684 he came to America as lieutenant in the English army and in 1688 was commissioned lieutenant-governor of New England and represented the governor, Sir Edmund Andros (q.v.) at New York. At the time of the accession of William and Mary in England and of the Leisler rebellion in New York, he was obliged to abdicate his office and return to England. (See LEISLER, JACOB.) In 1690 he was appointed lieutenant-governor of Virginia, and went to Jamestown to take charge of the affairs of the colony. During his administration, which was most successful, he gave especial attention to bettering the condition of the established church and to education; he was one of the founders of William and Mary College, to which he gave £300. When Andros succeeded Lord Howard as governor of Virginia, Nicholson, disappointed that he had not received the appointment, resigned as lieutenant-governor, and was made governor of Maryland. Here he aroused opposition by changing the capital from St. Mary's to Annapolis, and also by his intolerant attitude toward the Catholics and others not connected with the Church of England. In 1698 he was appointed governor of Virginia, but

failed to attain his former success in that colony. His constant menacing and tyrannical attitude aroused the opposition of the Virginians, and he particularly angered them by his removal of the capital from Jamestown to Williamsburg; he was recalled from Virginia in 1705. In 1710 he commanded an expedition against Canada and captured Port Royal, and in 1713 was made governor of Acadia. In 1719 he received his appointment as governor of South Carolina, being the first royal governor of that colony, and filled the office with ability and success. He returned to England in 1725, when he was promoted lieutenant-general. He wrote 'Journal of an Expedition for the Reduction of Port Royal' (1711); and 'An Apology or Vindication of Sir Francis Nicholson, Governor of South Carolina' (1724).

**Nicholson, Henry Alleyne**, English scientist: b. Penrith, Cumberland, 11 Sept. 1844; d. Aberdeen, Scotland, 19 Jan. 1899. He was educated at Göttingen and Edinburgh, was professor of natural history in the University of Toronto in 1871-4, of physical science in the Durham College of Physical Science in 1874-5, and of natural history at St. Andrews in 1875-82. From 1882 to 1899 he was regius professor of natural history at Aberdeen. He was elected F. R. S. in 1897. His chief work was done in the palaeontological department of zoology. Among his writings are 'A Manual of Palaeontology' (1872; 3d ed. with Lydekker 1889), 'Introduction to the Study of Biology' (1872), and many scientific papers.

**Nicholson, Isaac Lea**, American Protestant Episcopal bishop: b. Baltimore, Md., 18 Jan. 1844; d. Milwaukee, Wis., 29 Oct. 1906. He was graduated from Dartmouth in 1869, took priest's orders in the Episcopal Church in 1872, and held rectorships at Baltimore 1872-5; Westminster, Md., 1875-9; and St. Mark's, Philadelphia, 1879-91. In 1891 he was consecrated bishop of Milwaukee.

**Nicholson, James**, American sailor: b. Chestertown, Md., 1737; d. New York city 2 Sept. 1804. He went to sea when a boy, and was engaged in the capture of Havana in 1762. In 1776 he was given command of the *Defence*, fitted out by the colony of Maryland, and retook some vessels which the British had captured. In June 1776 he was assigned to the command of the *Virginia* of the Continental navy, and while his vessel was blockaded in Chesapeake Bay he with his crew joined the army and took part in the battle of Trenton. Later when the *Virginia* attempted to put to sea she went aground and was taken by the British, though Captain Nicholson and most of his crew escaped; an official inquiry acquitted him of all blame. In January 1777 he was made commander-in-chief of the Continental navy, holding that position till the close of the war. In June 1780, when in command of the frigate *Trumbull*, he fought a severe battle with the British ship *Wyoming*, without decisive result; and in August 1781 was taken prisoner in the *Trumbull* by the British vessels *Iris* and *General Monk*, though he made a most gallant resistance and did not surrender until his ship was completely disabled. He was exchanged shortly before the close of the war, and in 1801 was appointed commissioner of loans for the State of New York.

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**Nicholson, James William Augustus**, American sailor: b. Dedham, Mass., 10 March 1821; d. New York 28 Oct. 1887. He entered the navy as a midshipman in 1838, served in the Mexican War, and as lieutenant under Perry on the Japan expedition. In the Civil War he commanded the steamer Isaac Smith in the operations against Port Royal (1861); in 1862 was promoted to the rank of commander, and had charge of the monitor Manhattan in the battle of Mobile Bay; and later took part in the bombardment of Fort Morgan. In 1873 he was promoted commodore, and from 1876 to 1880 was in command of the Brooklyn Navy Yard. In 1881 he was made rear-admiral and was assigned to the Mediterranean, where he protected the United States consulate during the English bombardment of Alexandria, Egypt, and had much influence in restoring order. In 1883 he was retired from active service.

**Nicholson, John**, British officer in India: b. Dublin 11 Dec. 1821; d. near Delhi 23 Sept. 1857. He went to India in 1839 in the employ of the East India Company; showed great bravery in the defense of Ghazni in 1841 and during the treacherous attack made by the Afghans immediately afterward; served in the commissary during the first Sikh war, and actively in the second Sikh war; and was very successful as deputy commissioner of Lahore, doing especially good service during the Mutiny. He was mortally wounded in the assault on Delhi and died nine days afterward.

**Nicholson, Joseph Shfield**, English political economist: b. Wragby, Lincolnshire, 9 Nov. 1850. He was educated at the University of Edinburgh, at Trinity College, Cambridge, and at Heidelberg; and in 1880 became professor of political economy at Edinburgh. Among his writings on his specialty are: 'Effects of Machinery on Wages' (1878); 'The Silver Question' (1886); 'Principles of Political Economy' (1893-1901); 'Strikes and Social Problems' (1896). He wrote also some fiction, including 'Thoth' (1888); 'Toxar' (1890); and edited (1884) Adam Smith's 'Wealth of Nations.'

**Nicholson, Louisa Margaret** (LOUISE NIKITA), American singer: b. Philadelphia, Pa., 1872. She was educated abroad, where she made her debut in 1889 with marked success, and became prima donna at the Paris Opera in 1894. The roles in which she has achieved most success are: 'Fille du régiment'; 'Traviata'; 'Pagliacci'; etc.

**Nicholson, Meredith**, American author: b. Crawfordsville, Ind., 9 Dec. 1866. He entered journalism and in 1885-97 was reporter and editor on the Indianapolis *News*. In 1897-1901 he was treasurer of a coal-mining company in Denver and then returned to Indianapolis, where he has since devoted himself to literature. He has written: 'Short Flights,' verse (1891); 'The Main Chance' (1903); 'The Hoosiers' (1900); etc.

**Nicholson, Reynold Alleyne**, English Orientalist: b. 19 Aug. 1868. He was a son of H. A. Nicholson (q.v.). He was educated at the University of Aberdeen and at Trinity College, Cambridge, continuing his studies in Germany. He was examiner in classics at Aberdeen in 1897 and since 1901 has been professor of Persian in University College, London, and lec-

turer in Persian at the University of Cambridge. He has published: 'Selected Poems from the Divani Shamsi Tabriz' (1898).

**Nicholson, William**, English artist: b. Newark-upon-Trent 1872. He began his artistic education under Herkomer in London and completed it under Bougereau and Constant in Paris. He collaborated with James Pryde in the designing of posters, whose brilliant originality at once attracted attention and established his reputation as a great wood engraver. Among his productions the most notable are: 'An Alphabet' (1898); 'An Almanac of Twelve Sports' (1898); 'London Types' (1898); and 'Characters of Romance.' His portrait woodcuts have met with wide recognition, especially his 'Whistler'; 'Kipling'; 'Bernhardt'; 'Queen Victoria.'

**Nicias**, nish't-as, Greek painter of the 4th century B.C. He was renowned for the loveliness of his woman figures in encaustic (q.v.). He was a contemporary to Apelles, the painter of Alexander the Great, and Praxiteles the sculptor, whom he assisted in coloring his statues. He is said to have invented encaustic painting.

**Nicias**, Athenian general in the Peloponnesian war (q.v.): d. Sicily 443 B.C. He inherited great wealth from his father, Niceratus, and, entering politics after Pericles' death, became leader of the aristocratic party and the enemy of all demagogues, notably Cleon. He won popular favor, however, by his lavish use of his wealth. His natural caution and timidity was a proverb among the comic poets of the day, and he seems to have been the prey of blackmailers. In 425 he led the troops that hemmed the Spartans in at Sphacteria; in the next year captured Cythera; in 423 was in command in Thrace; and, after Cleon's death, brought about the famous Peace of Nicias (421). Cleon's place as a leader of the war party was to a certain degree taken by Alcibiades, who won consent to his plan for the Sicilian expedition largely by his clever suggestion that Nicias, the opponent of the project, the tried general, and the well-known conservative, should be one of the commanders of the expedition. The recall of Alcibiades soon after the expedition started left matters largely in Nicias' hands. After the death of his colleague Lamachus this was less true, since the new general Demosthenes boldly urged open attack on Syracuse. Nicias saw that this would be fatal, and influenced by superstitious fear of an eclipse of the moon refused to act at all for a month. He was terribly defeated; weakly surrendered; and in spite of the promises of his enemies was put to death. He had been mortally sick throughout this trying campaign. Consult Church, 'Nicias and the Sicilian Expedition' (1899).

**Nick of the Woods**, a romance by Robert Montgomery Bird, M.D., published in 1837. It is a tale of Kentucky during the "dark and bloody" days, and was very popular about the middle of the 19th century. A play, founded upon this narrative, was received with boundless applause, held the stage (a certain grade of stage) for many years, and was a forerunner of the "dime novel" in stimulating a desire among boys to run away from home and go West to kill Indians. The author was taken to task by some critics who complained that he pictures the red man upon a plane far below that of the noble



## NICKEL — NICKEL-STEEL

savage described by Cooper and others. Bird replied that he described the cruel, treacherous, and vindictive Indian as he existed, and not the ideal creation of a novelist.

**Nickel**, a metallic element resembling iron in its appearance and general properties, discovered by Cronstedt in 1751 in kupfernickel (see NICCOLITE), a mineral which resembles copper ore, but from which copper cannot be extracted, and whose name appears to signify "devil's copper." Metallic nickel occurs in the form of grains along the bed of the Fraser river, and it is also a common constituent of meteorites. The commercial supply, however, is obtained by the reduction of certain nickel-bearing minerals, of which niccolite and garnierite are the most important. The latter mineral is especially valuable because it is free from cobalt, a metal with which nickel is almost always associated, and from which it can be separated only with much difficulty. Garnierite is a hydrated silicate of nickel and magnesium, of variable composition, which occurs in vast quantities in the vicinity of Noumea, New Caledonia; similar deposits also exist in Douglas County, Oregon, and Jackson County, North Carolina, and also in the province of Malaga, Spain. The New Caledonia mines are worked by a French company, which ships the nickel to Europe both as matte and as ore.

Physically, nickel is a hard, ductile, malleable metal, white in color, but with a yellowish tinge, and susceptible of a fine polish. Its specific gravity varies from 8.36 to 9.26, according to the physical treatment to which the metal has been subjected; its specific heat is about 0.109, and its specific electrical resistance is about one seventh of that of mercury. It melts at a high temperature,—probably at about 2,500° F. Next to iron and cobalt, nickel is the most magnetic substance known, the magnet attracting it very strongly, though less strongly than either of the other two metals mentioned. (For full data concerning the magnetic qualities of nickel, consult Ewing, 'Magnetic Induction in Iron and Other Metals.') Nickel is greatly used for electroplating, both for protection against rusting, and on account of the lustrous polish that can easily be given to articles coated with it. It is also largely coming into favor for the manufacture of cooking utensils. When alloyed with other metals, nickel is used for coinage, and for other purposes past enumeration. With iron it forms alloys that are collectively known as "nickel-steel," certain of these being of the highest value for the manufacture of armor plate. The nickel-iron alloys are anomalous in many respects. It has been found, for example, that although nickel and iron are two of the most highly magnetic elements known, it is possible to form alloys of these two metals alone, which are practically non-magnetic. Iron-nickel alloys are also anomalous with respect to their coefficients of expansion, and one of them in particular (known as "invar") has a coefficient of expansion which is almost inappreciable, although iron and nickel, separately, have coefficients of considerable magnitude. Chemically, nickel is a dyad. It has the chemical symbol Ni, and an atomic weight of 58.7 if  $O=16$ , or of 58.3 if  $H=1$ . Its most important oxids are the monoxid,  $NiO$ , and the sesquioxid,  $Ni_2O_3$ .

The metal itself does not oxidize in air at ordinary temperatures, but only when strongly heated in contact with air or with steam. The monoxid,  $NiO$ , may be prepared by the direct oxidation of the metal at a high temperature in an atmosphere of steam, or by precipitating a solution of a nickel salt with caustic potash, and then heating the green nickel hydrate,  $Ni(OH)_2$ , which is thrown down. The monoxid is a green powder, which becomes yellow when heated, and from it the various nickel salts may be prepared. The sesquioxid,  $Ni_2O_3$ , is a black substance, and is most conveniently prepared by adding a solution of bleaching powder to a soluble nickel salt. Nickel bromide,  $NiBr_2$ , nickel chloride,  $NiCl_2$ , and nickel sulphate,  $NiSO_4 \cdot 7H_2O$ , are used in medicine to a limited extent. Sulphuretted hydrogen gas precipitates nickel from alkaline solutions in the form of a black sulphide, having the formula  $NiS$ . (See CHEMICAL ANALYSIS.) Finely divided nickel absorbs dry carbon monoxid at 85° F., with the formation of a singular compound called "nickel carbon monoxid," having the formula  $Ni(CO)_4$ . This substance is a volatile liquid which freezes at 13° F. below zero, and boils at 109° F. Its vapor explodes violently when heated to 140° F., and deposits pure nickel when mixed with an inert gas and passed through a heated tube. Advantage is taken of this strange compound for the preparation of metallic nickel for chemical purposes, when great purity is essential.

**Nickel Glance**, a name applied to two nickel ores, one marked by the presence of arsenic, and the other by that of antimony. The first ( $NiAs_2S_2$ ) is grayish, isomorphous or amorphous; consists of 35.5 parts nickel to 45.2 arsenic and 19.3 sulphur; and is found in Loos, Sweden, Ems, Germany, and Schladmig, Styria. The second ( $NiSb_2S_2$ ) is a chemical analogue of the first, found in Montenarba, Sardinia, Waldenstein in Carinthia, etc. It occurs in dodecahedral and tetrahedral crystals, but more frequently is amorphous. Its color varies from bluish to steel gray.

**Nickel-Steel**. Following the hint offered by iron and nickel alloys in meteorites, experiments in making nickel-iron and nickel-steel began 80 years ago when Faraday and Stodart alloyed nickel and iron (1822). Further experiments, to mention only a few names, were made by Wolf in Schweinfurt (1830), by Bessemer (1858), and by John Garugee of Connecticut (1883). The first systematic and practical tests of the value of nickel-steel were made by James Riley of Glasgow in 1888-9. The experiments of C. E. Guillaume of the International Bureau of Standards reported in 1899 showed that in addition to its previously known characteristics, the most notable of which were resistance to corrosion much greater than that of carbon steel and the remarkable combination of high resistance to stresses with great malleability and ease of working, nickel-steel, if containing more than 36 per cent of nickel, has the lowest coefficient of expansion known, thus proving an invaluable material for instruments of precision. Much more widespread, of course, is the use of nickel-steel for armor plate largely adopted because of its unequalled hardness and toughness and because its loss of strength from punching is only 15 to 20 per

## NICKER—NICOL PRISM

cent of the original strength, whereas carbon steel loses about 33 per cent when punched. A second and more important use, though apparently limited by the expense of nickel-steel, is for rails; a test made by the Pennsylvania Railroad on the Horseshoe Curve resulted so favorably in 1902 that about 10,000 tons of nickel-steel rails (3.5 per cent nickel) were ordered by the company at a cost nearly double that of the carbon steel rails. Extensive use of nickel-steel seems impossible because of the limited annual production of nickel, the world's total for 1902 being only 8,600 metric tons. However, for ordinary uses only a very small percentage of nickel is required. The alloys with larger proportions of nickel (above 36 per cent) not only have a surprisingly low coefficient of expansion, but differ from the alloys with less nickel in respect to magnetism; alloys with less than 25 per cent of nickel can be made non-magnetic or magnetic to any desired degree; between 25 and 35 per cent the alloys have magnetism varying with temperature; and above 35 or 36 per cent the magnetism stays at its maximum for ordinary temperatures.

**Nicker**, in Teutonic mythology, water-fairies which dwell in rivers and lakes as well as in the sea. Mention is made of them in the poem of 'Beowulf.' The word seems originally to have been used as an indefinite name for any water-monster. Traces of it may be found in 'Old Nick,' nix, and nixy (borrowed from German *Nixe*).

**Nicobar** (nik-ō-bār') **Islands**, a group of 19 islands in the Bay of Bengal, between lat. 6° 45' and 9° 15' N. and lon. 93° and 94° E. with the Andamans (q.v.) to the north, forming a province of British India. The Nicobars consist of two groups—a southern group, composed of the islands Great and Little Nicobar and several smaller islets, and a northern group, separated from the southern by Sombrero Channel, about 36 miles broad. The largest island is Great Nicobar, 30 miles long by 12 miles broad, and the next Kamorta, which is the largest of the northern group. They yield coconuts, plantains, teak, sassafras, and pineapples. The thick forests and heavy dews render the climate unhealthy for foreigners. The coconut palm yields the chief food of the natives, and is almost the only tree cared for by them. The people belong to two races, an inland tribe, little civilized, who show Mongolian affinities and are regarded as indigeneous, and the coast people, about 6,000 in number, who are of mixed Malay blood, but idle and lazy. They collect and export trepang and edible birds'-nests. The archipelago was occupied by Denmark, 1756-1856. In 1869 it was annexed by Great Britain, to put a stop to the piracy of the people. A penal colony for India exists at Nancovory on the island Kamorta.

**Nicobar Pigeon**. See **PIGEONS**.

**Nicodemus**, nīk-ō-dē'mūs, ruler of the Jews, that is, a member of the Sanhedrin, who belonged to the sect of the Pharisees, came to see Jesus secretly by night, and eventually after the Resurrection is traditionally said to have become one of his disciples. He protested against the injustice with which Christ was treated by the council (John vii. 50) and after the crucifixion joined with Joseph of Arimathea in giving fitting

sepulture to the body of Christ. Some commentators have fancifully identified Nicodemus with the rich young man (Mark x. 17-24), but there seems to be no solid ground for the conjecture.

**Nicol**, nīk'ōl, **Erskine**, Scottish artist: b. Leith, near Edinburgh, 3 July 1825. He was educated in art at the Trustees' Academy, Edinburgh, under Sir William Allan. He resided some time in Dublin, where he painted portraits and subjects of humorous genre. Here he gathered material for his numerous clever pictures of Irish peasant life, among which may be mentioned 'Donnybrook Fair' (1859); 'Paddy's Mark' (Corcoran Gallery, Washington); 'Paying the Rent' (Vanderbilt Collection, N. Y.).

**Nicol Prism**, a piece of apparatus invented in 1828, by William Nicol, for the production of a beam of plane-polarized light. Its operation is

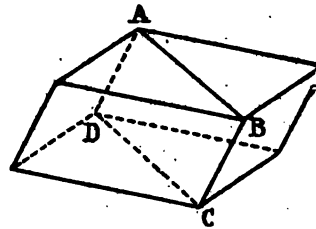


FIG. 1.

based upon the fact that when a beam of ordinary light enters a crystal of Iceland spar (crystallized calcite) from certain directions, it is decomposed into two beams, each of which is plane-polarized. One of these beams is called the "ordinary ray," and the other the "extraordinary ray"; and as the mineral exerts a different refractive power upon the two, they are divergent within the crystal. Nicol conceived the idea of introducing a surface of discontinuity within the crystal, disposed at such an obliquity that one of these rays would be totally reflected, while the other would be transmitted, and allowed to emerge from the crystal in a direction parallel to that in which the incident beam entered it. His prism is made by cutting a rhomb of Iceland spar as indicated by the plane, ABCD, in Fig. 1, which passes through the obtuse angles of the crystal. The surfaces being then polished, the parts are cemented together again with Canada balsam, as shown in Fig. 2. The

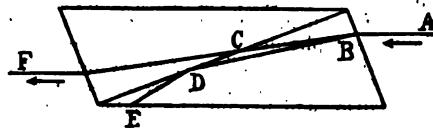


FIG. 2.

ends are ground so as to make an angle of about 68° with the length of the rhomb, and a ray of ordinary light, upon entering the crystal as indicated at AB, in Fig. 2, is separated into two rays. Both are refracted, but the "ordinary ray," BD, is refracted more than the "extraordinary" one, BC; and BD strikes the plane of section of the crystal at such an obliquity that it is totally reflected to F, while BC, striking it at a less obliquity, passes through and emerges from the crystal at A. The sides of the rhomb

## NICOLA — NICOLE

are usually blackened, so that the ordinary ray is absorbed at E, and destroyed. The Nicol prism is exceedingly valuable, as it gives a beam of light that is completely polarized, and entirely without color, when the incident light is white.

**Nicola**, nīk'ō-lā, **Lewis**, American soldier: b. Dublin, Ireland, 1717; d. Alexandria, Va., 9 Aug. 1807. He entered the English army in 1840, rose to the rank of major, but resigned and emigrated to America, where he settled in Philadelphia. During the American Revolution his military experience was of great assistance to the Colonies, and in 1783 he became brigadier-general. It was he who wrote to Washington what is known as the 'Nicola Letter,' in which it is suggested that the latter should be made king. He wrote 'A Treatise of Military Exercise' (1776).

**Nicolai**, nē'kō-lī, **Christoph Friedrich**, German publisher and author: b. Berlin 18 March 1733; d. there 8 Jan. 1811. From his father he inherited in 1752 the business of the Nicolai publishing company, which he made one of the foremost in Berlin. In his youth he was a friend of Lessing and of Moses Mendelssohn, with whom he founded the 'Bibliothek der schönen Wissenschaften' (1757), a critical review, and another literary journal, the 'Briefe die neueste Litteratur betreffend' (1761). But little by little he broke with the leaders of German thought and began to attack both the critical school and the romantic movement. Goethe and Schiller replied in 'Xenien' to his parodies of 'Werther' (1775), etc. Nicolai wrote a novel with a rationalistic purpose, 'Sebaldus Nothanker' (1773), and merits praise for his excellent 'Description of a Trip through Germany and Switzerland' (1789), and for the historical value of his 'Anecdotes of Frederick II.' (1788-92). Consult the autobiography, edited by Löwe (1806) and the 'Life' by Göckingk (1820).

**Nicolai**, Otto, German composer: b. Königsberg, Prussia, 9 June 1810; d. Berlin 11 May 1849. He received his musical education from B. Klein of Berlin, and his first work produced in public was a 'Te Deum' performed at the Singakademie in 1833. In 1833 the Chevalier Bunsen obtained for him the post of organist at the chapel of the Prussian embassy in Rome, where he made careful study of Italian church-music. He was kapellmeister of the Court opera at Vienna 1837-9 and 1842-8, and subsequently of the Berlin opera. He founded the philharmonic concerts at Vienna for the purpose of securing worthy renderings of the Beethoven symphonies. His best-known work is his 'Die lustigen Weiber von Windsor' (libretto by S. Mosenthal), first presented at Berlin 9 March 1849, which won and maintained great success by its humorous characterization, invention, and technical skill. Consult Mendel, 'Life' (1866), which contains a list of all Nicolai's works, printed and in MS.

**Nicolaief**, nē-kō-lī'ēf. See **NIKOLAIEF**.

**Nicolaitans**, nīk-ō-lā'f-tanz, a sect mentioned in Rev. ii. 6, 15, as given over to idolatrous practices and impurity of life. They thus contravened the decree of the Council of Jerusalem, Acts xv. 20-29, and were accordingly accounted heretics. There seems to be no ground for supposing that this sect was founded by

Nicolas, the proselyte of Antioch, who was one of the seven deacons.

**Nicolardot**, Louis, loo-ē nē-kō-lār-dō, French author: b. Dijon, France, 28 Nov. 1822; d. Paris, France, 21 Nov. 1888. His literary work is favorably known and among his more notable publications are: 'Journal of Louis XVI.' (1873); 'The Impeccable Theophile Gautier' (1883); 'La Fontaine and the Human Comedy' (1885); etc.

**Nicolas**, nīk'ō-lās, **Sir Nicholas Harris**, English antiquarian: b. Dartmouth 10 March 1799; d. near Boulogne 3 Aug. 1848. He was of French Protestant descent; served eight years in the navy (1808-16); studied law; and became the leading genealogist of his day. Hood, for instance, says that Miss Kilmansegg's ancestry 'Were enough, in truth, to puzzle Old Nick, not to mention Sir Harris Nicolas.' Among his many works are: 'Notitia Historica' (1824); 'History of Agincourt' (1827); 'Proceedings and Ordinances of the Privy Council of England, 1386-1542' (1834-7); 'Despatches and Letters of Lord Nelson' (1844-6), and 'History of Royal Navy' (down to Henry V., 1847).

**Nicolaus** (nīk-ō-lā'ūs) of **Damascus**, Greek historian. He lived in the time of Herod the Great and was intimate with that monarch. He tutored the children of Antony and Cleopatra. Of his writings, a 'Universal History' in 144 books, and his biography of Augustus, fragments of great value, remain. Consult Müller 'Fragmenta Historicum Græcorum,' Vol. III., pp. 343-464.

**Nicolay**, nīk'ō-lā, **John George**, American author: b. Essingen, Bavaria, 26 Feb. 1832; d. Washington, D. C., 26 Sept. 1901. He came with his family to the United States in 1838 and settled in Illinois where he was educated in the public schools. He entered the office of the *Free Press* in Pittsfield, Ill., when 16 and later became its proprietor and publisher, soon making himself a political power in the State. In 1856 he entered the office of the secretary of state at Springfield, Ill., where he became a devoted adherent of Lincoln. When the latter was elected to the presidency Nicolay was appointed his private secretary, and as the duties of the office increased John Hay (q.v.) was selected as assistant secretary. Together they formed the plan of writing a biography of President Lincoln and gained his approval of their project. In 1865 Nicolay was appointed by the President to be United States consul at Paris, where he remained until 1869, and in 1872-87 he was marshal of the Supreme Court. In 1874 he began in collaboration with John Hay 'Abraham Lincoln, a History,' published serially (1886-90), and in book form, supplemented by Lincoln's 'Complete Works' in 12 vols. (1894). He also wrote 'The Outbreak of the Civil War' (1881).

**Nicole**, François Léon Etienne, frān-swā lā-ōn ā-tē-ēn nē-kōl, Haitian poet: b. near Grande Rivière 1731; d. Cape François 1773. Educated in a Jesuit College, he went to Paris in 1750, where Voltaire introduced him to the Encyclopedists and Louis XV. granted him a pension in recognition of his talents. In 1769 he returned to Haiti, where he was in the governor's employ. He published: 'The Romance of the

Slave' (1766); 'Tropical Flowers' (1770); and 'New Poems' (1772).

**Nicole, Pierre**, pè-är, French moralist: b. Chartres 19 Oct. 1625; d. Paris 16 Nov. 1695. Graduated from the University of Paris in 1644, he was a member of the Port Royal community, held a professorship in it, wrote many of its school-books, was one of its controversialists with the Jesuits, and shared in its vicissitudes. The Abbé Goujet, who wrote his 'Life' (1732), says that he aided in the preparation of some of Pascal's 'Lettres Ecrites par Louis de Montalte' ('Provincial Letters'; 1656), and translated the series into Latin (1658). His best work is in his 'Essais de Morale et Instructions Théologiques' (25 vols. 1671 et seq.), one of which 'On the Means of Preserving Peace,' was praised rather extravagantly by Voltaire.

**Nicolé**, in Molière's 'Bourgeois Gentilhomme,' a servant of the Monsieur Jordain, who understands and exposes her master's follies in an amusing way.

**Nicolini**, nê-kô-lé'nê, **Ernesto**, French singer, whose real name was Ernest Nicolas: b. Saint-Malo 1834; d. Pau January 1898. His splendid tenor was trained at the Conservatoire. He made his début in Paris in 1857, soon afterward devoted himself to Italian opera, and Italianized his name, returned to Paris and then toured Europe. His last years were spent off the stage, because of ill-health. He married Adeline Patti in 1886.

**Nicoll**, nîk'ôl, **William Robertson**, Scottish clergyman and editor: b. Lumsden, Aberdeenshire, 10 Oct. 1851. He was educated at the University of Aberdeen, and was Free Church minister of Dufftown (1874-7) and Kelso (1877-85). He became editor of several periodicals, including the 'British Weekly,' the English 'Bookman,' the 'Expositor,' and (1900) the 'British Monthly.' Among his publications are: 'Calls to Christ' (1881); 'John Bunyan' (1884); 'Ten-Minute Sermons' (1895); 'The Key of the Grave'; 'Sunday Afternoon Verses' (1897); 'Letters on Life' (1901). He also edited 'The Expositor's Greek Testament' (1897-1900) and the complete works of Charlotte Brontë (1902).

**Nicollet**, nê-kô-lâ, **Jean Nicolas**, French explorer: b. Cluses, Savoy, 24 July 1786; d. Washington, D. C., 11 Sept. 1843. He came to the United States in 1832 to make a scientific investigation of the southern and western States, and was later engaged by the United States government to make an exploration of the far West. He published: 'Lettre sur les Assurances qui ont pour Base les Probabilités de la Durée de la Vie humaine' (1818); 'Mémoire sur le Mesure d'un Arc de Parallèle moyen entre le Pôle et l'Équateur' (1826); etc.

**Nicolls**, nîk'ôlz, **Mathias**, English colonial jurist: b. Plymouth, England, about 1630; d. Long Island, N. Y., 22 Dec. 1687. He was appointed secretary of the commission and captain under Col. Richard Nicolls, who was sent to capture New Netherlands in 1664. He became the first secretary of the province and a member of the governor's council and later was presiding judge of the court of assizes. In 1672 he was elected third mayor of New York, and in 1683 was appointed a judge of the supreme court of the colony.

**Nicolls**, Sir **Richard**, English colonial governor: b. Amptill, Bedfordshire, England, 1624; d. at sea 28 May 1672. During the civil war in England he joined the king's army, was placed in command of a troop of horse, and when the royalists were defeated fled to Holland, where he entered the service of the Duke of York, serving with him in the Continental wars. On the accession of Charles II. he was appointed gentleman of the bed-chamber to the Duke of York. In 1664 the king made him the chief of a commission appointed to settle the affairs of the New England colonies and to take New Netherlands from the Dutch. He sailed from England in the same year, and after stopping at Boston for a short time reached New Amsterdam on the 25th of August. The Dutch surrendered to him without resistance; he took formal possession of the city on 8 September, the Dutch officials shortly after taking the oath of allegiance to the English king. Nicolls changed the name of the province and the city of New Amsterdam to New York; and also gave Albany its present name. In 1665 he proclaimed the 'Duke's Laws' which had been prepared under his direction; this was the first code of laws in New York, and combined features of the English law with the Roman-Dutch law formerly prevailing in the province. In the same year he gave an English form of city government to New York city. His administration was efficient, and especially moderate and considerate toward the Dutch, and he was respected and trusted by English and Dutch alike. In 1666 he successfully settled some difficulties with the French and Indians; in 1667 resigned but did not leave the colony till the arrival of his successor, Lovelace. He returned to England in 1668, and taking part in the war between England and Holland, was killed in the naval battle against De Ruyter in 1672.

**Nicomachus**, nî-kôm'a-kûs, surnamed **GERASENUS**, Pythagorean philosopher: b. Gerasa, Palestine, about 1st century A.D. He was one of the earliest writers on mathematics and music and his name became a synonym for mathematical accuracy. "You number like Nicomachus of Gerasa" being a Philopatris proverb. He wrote a life of Pythagoras and several musical and mathematical works now lost. Enough, however, remains of his work to have greatly influenced the learning in the 15th and 16th centuries.

**Nicomedia**, nîk-ô-mê'dî-â, Asia Minor, an ancient city of Bithynia, its site occupied by the modern Izmid or İzmikmid (pop. 80,000), at the northeast corner of the Gulf of Izmid—the ancient Astacenus,—an arm of the Propontis or Sea of Marmora. It was named after its founder Nicomedes I. (278-250 B.C.) and was a residence of the Bithynian kings, a city of great splendor, and in later times a favorite place of resort with the emperors Diocletian and Constantine the Great. Arrian, the historian, was a native, and Hannibal committed suicide here. There are numerous interesting remains of the city.

**Nicopolis**, nî-köp'ô-lîs, signifying "City of Victory," the name of many ancient cities. (1) **NICOPOLIS** in Epirus on the northern side of the Ambracian Gulf (Gulf of Arta), was built by Augustus in commemoration of his naval victory over Antony at Actium, the opposite promontory, which made him master of the Roman Em-

pire. Augustus built at the same time a temple on the neighboring hill in honor of Apollo, and instituted games to be celebrated every fifth year. It was probably the place where Saint Paul passed the last winter of his life, Titus iii. 12. Ruins of this city are still to be seen near Prevesa. (2) Now Nicopoli, a city on the Danube, in Mœsia Inferior, built by Trajan in memory of a victory over the Dacians. There is still an important town here, in the principality of Bulgaria, capital of a district of same name, 54 miles west of Rustchuk and 234 miles northwest of Constantinople. It is the seat of a Greek archbishop and a Roman Catholic bishop. Bajazet I., the Turkish emperor, gained a victory here over Sigismund, king of Hungary, in 1396; the place was taken by the Russians in 1810, 1827, and 1877. Pop. 20,000. (3) A city in Lower Egypt, a little to the east of Alexandria, built by Augustus to commemorate his final victory over Antony.

**Nicot, Jean**, zhôn nê-kô, SIEUR DE VILLEMMAIN, French diplomat: b. Nîmes 1530; d. Paris 5 May 1600. He studied in Paris, was a courtier of Henry II., and acted as envoy of Francis II. to Lisbon (1560), whence he introduced tobacco into France. To this circumstance the scientific name for tobacco, *Nicotiana*, is due. Nicot wrote a French dictionary, 'Trésor de la Langue Française' (1606).

**Nicotiana**, nî-kô-shî-â'na, a genus of plants of the potato family (*Solanaceæ*), represented by the two species of tobacco (*N. tabacum* and *N. rustica*). These plants abound in all their parts with poisonous elements, the special and characteristic one in this case being the alkaloid nicotine, to which tobacco owes its peculiar narcotic properties. See TOBACCO.

**Nicotin**, or **Nicotine**, the characteristic alkaloid element of tobacco. For its properties and effects see TOBACCO.

**Nicoya**, nê-kô'yâ, a gulf on the west coast of Costa Rica, extending inland north by west about 60 miles and from 20 to 30 miles in width. Along the shore are high mountains, and many picturesque inlets. Cape Blanco is at the entrance. Punta Arenas, on the east shore, is a port of entry.

**Nitheroy**, nê-tâ-rô'ê, Brazil, a town of Rio de Janeiro, prior to 1894 the capital of the state, on Praia Grande Bay in the Bay of Rio de Janeiro, opposite the city of that name. It is noted for its elegant suburban residences. Pop. about 30,000.

**Nicum**, nîk'ûm, John, American Lutheran clergyman: b. Winneriden, Württemberg, Germany, 6 Jan. 1851. He was educated at Muhlenberg College, Allentown, Pa., and the Theological Seminary, Philadelphia, and, entering the ministry, held Lutheran pastorates at Philadelphia and Syracuse, and since 1887 has had charge of St. John's Lutheran Church in Rochester, N. Y. Since 1894 he has also been professor of mental and moral science in Wagner Memorial Lutheran College at Rochester. He has published: 'Gleichnisse-reden Jesu' (1884); 'Confessional History of the Lutheran Church in the United States' (1891); etc.

**Nibelungen Leid**. See NIBELUNGEN LIED.

**Niebuhr**, nê'boor, Barthold Georg, German historian and classical scholar, the founder

of modern historical method: b. Copenhagen 27 Aug. 1776; d. Bonn 2 Jan. 1831. He was son of Karsten Niebuhr (q.v.); was educated by his father in his early youth; studied at Kiel (1794-6), at London and at Edinburgh (1798-9); and in 1880 entered the employ of the Danish government. He became director of the government's bank in 1804, and showed in this post and in the Prussian service, which he entered in 1806 much business ability, due, so he thought, to his life in England and Scotland. A quarrel with Hardenberg made Niebuhr's retirement necessary in 1810, soon after he had been engaged in financing a Prussian loan in Holland; he taught Roman history at Berlin for three years with such success that he was led to publish the first two volumes of his 'Roman History' (1811-12). But in 1813 he re-entered the Prussian government employ, took a prominent part in rousing national opposition to Napoleon; but his temper was overbearing and he soon broke with his superior, Stein. In 1816 he was sent as minister to the Vatican, brought about the understanding between Prussia and the Pope, signalized by the Bull 'De Salute Animarum' in 1821, and had his first opportunity of testing his critical theories as to early Roman history by topographical and other detail. In 1823 he retired from the diplomatic service and settled in Bonn, where he lectured on ancient and modern history. Niebuhr's great work was his destructive criticism of early Roman legend, and his reconstruction of this same period from the same mass of myth and legend; or, to put it more broadly and more truly, it was his application of this higher critical method to history. His 'Roman History' (1811-32, English version, Hare and Thirlwall, 1851), carrying the story of Rome down to the Punic Wars, was completed in an English form by Leonhard Schmitz in 'Lectures on the History of Rome from the First Punic War to the Death of Constantine' (1844). These two parts form a great collection of facts and material, and a wonderful exemplification of method, but the more popular and brilliant style of Niebuhr's pupil, Theodor Mommsen (q.v.), has made Niebuhr's work to a certain degree antiquated. He collaborated with Platner and Bunsen in their 'Description of the City of Rome'; founded with Böckh and Brandis the 'Rheinisches Museum,' a classical review; edited the 'Corpus Scriptorum Historiæ Byzantinæ'; and wrote many minor philological and historical studies, besides editing new fragments of Gaius, Cicero, and Merobaudes. His 'Stories of the Greek Heroes' ('Griechische Heroengeschichte,' 1842), originally written for his son, Marcus, is a famous juvenile. Niebuhr was a man of broad scholarship and catholic taste, as may be seen by his personal reminiscences and correspondence in Hensler's 'Lebensnachrichten über Niebuhr' (1838-9). Consult also the biographies by Classen (1876) and Eyssenhardt (1886).

**Niebuhr, Karsten**, German traveler, father of B. G. Niebuhr (q.v.): b. Lüdingworth, Hanover, 17 March 1733; d. Meldorf, Prussia, 26 April 1815. In 1760 he entered the Danish service as lieutenant of engineers, and in 1761 joined the expedition sent by Frederick V. of Denmark to explore Arabia. All his companions in this expedition having died within a

year after their departure, he went on alone, and in 1766 returned to Copenhagen. The works in which he gave the world the result of his expedition are remarkable for their accuracy. They include: 'Beschreibung von Arabien' (1772); 'Reisebeschreibung von Arabien und anderen umliegenden Ländern' (1774-8). Consult his son's 'Karsten Niebuhrs Leben' (1817).

**Niecks**, *něks*, **Frederick**, Anglo-German composer and critic: b. Düsseldorf, Germany, 3 Feb. 1845. He was educated at Leipsic University and was a violinist and music teacher in his native city till 1865 when he settled in Scotland, where he was for some years engaged in teaching music, and since 1875 he has written much for musical journals. Since 1891 he has been Reid professor of music at the University of Edinburgh. He has published: 'A Concise Dictionary of Musical Terms' (1884); 'Chopin as a Man and Musician' (1888).

**Niedermeyer**, *nē'dēr-mī-ēr*, **Louis**, Swiss composer: b. Nyon 27 April 1802; d. Paris 14 March 1861. He studied under Moscheles in Vienna, and in Italy with Fioravanti and Zingarelli; settled in Paris; and, having met with no great success in operatic music, such as 'Marie Stuart' (1844) and 'La Fronde' (1853), devoted himself to religious music, not only composing but teaching and editing a journal called 'La Maitrise.' His opera 'Stradella' and his melody for Lamartine's 'Lac' are his best compositions of a secular sort. His training school for religious music was aided by the French government.

**Niederwald**, *nē'dēr-vālt*, Germany, the western termination of the Taunus range in the Prussian district of Wiesbaden, abutting on the Rhine opposite Bingen. On a commanding site near its summit was erected, 28 Sept. 1883, the national memorial commemorative of the successful war of 1870-1. An extended pedestal, ornamented with allegorical figures, is surmounted by a bronze figure of Germania, 34½ feet in height. The whole was designed by Schilling, a Dresden sculptor. Toothed-railways carry visitors up to the monument from the villages of Rüdesheim and Assmannshausen at the foot, both noted for their wine.

**Niehaus**, *nē'how's*, **Charles Henry**, American sculptor: b. Cincinnati, Ohio, 24 Jan. 1855. He learned his art in the Royal Academy of Munich, Germany. He was there awarded a medal. A high award was received by him at the World's Columbian Exposition. His work is seen in the Congressional Library, Washington; Trinity Church, N. Y., and the Appellate Court House, in the same city.

**Niel**, *nē-ēl*, **Adolphe**, French marshal: b. Muret, Haute-Garonne, France, 4 Oct. 1802; d. 14 Aug. 1869. He was educated at the Ecole Polytechnique, Paris, and the Military School, Metz, and in 1835 became captain of engineers. He took part in the expedition against Constantine in Algeria 1836-7; commanded the engineers at the siege of Rome in 1849 during the revolutionary movement under Garibaldi, and as chief of engineers planned the operations against Sebastopol in 1854-5. He figured prominently at Magenta and Solferino in the Italian campaign of 1859, was made a marshal of France by Napoleon III. in return for his services, and in 1867 became minister of war.

**Niel's Work**, in art, a method of ornamentation much practised in the Middle Ages, and to which may be traced the origin of engraving. The lines of a design are cut in a piece of gold or silver; it is then covered with a black composition consisting of copper, silver, lead, and sulphur, and a little borax is sprinkled over it by subjecting it to heat over a fire, the composition becomes liquid and runs into the lines of the design; the whole is then allowed to cool, when the surface of the metal is scraped and burnished, leaving the drawing in black upon the metal. The art is still practised as a mode of ornamenting ware, but its principal use is for door-plates, plates for shop fronts, etc., in which the brass or zinc plates are engraved and the depressions filled with wax. The term is also applied to impressions in a viscid water-ink on paper from metal-plate engravings taken by the early fathers of copperplate printing for testing the state of their work. See ENGRAVING.

**Niemann**, *nē'mān*, **Albert**, German operatic tenor: b. Erxleben, near Magdeburg, 15 Jan. 1831. At first a worker in a machine factory, he became an actor in 1849; was trained in singing by Schneider, hofkapellmeister at Dessau, and by Musch, a baritone; appeared at Berlin, Stuttgart, and Königsberg; and after further study under Duprez at Paris, was made 'kammersänger' to the emperor and attained great success throughout Germany. From 1866 until his retirement in 1889 he was connected with the court opera of Berlin, where he was distinguished in heroic roles. Wagner selected him to impersonate Siegmund in 'Die Walküre' at Baireuth in 1876. He appeared with success in the United States in 1887-8.

**Niemen**, *nē'mēn* or *nyēm'ēn*, a river of Russia, with 70 miles, the lower part of its course of 500 miles, lying within the province of East Prussia, where it is called the Memel. It rises a few miles south of the city of Minsk. It is navigable to Grodno; below Tilsit it divides into two branches, which reach the Kurisches Haff each by four mouths.

**Niemeyer**, *nē'mī-ēr*, **Felix von**, German physician, grandson of the poet and theologian August Hermann Niemeyer: b. Magdeburg 31 Dec. 1820; d. Tübingen 14 March 1871. He was educated at Halle; practised in Magdeburg 1844-55; was professor of pathology and therapeutics at Greifswald, and from 1860 at Tübingen; was military surgeon during the Franco-Prussian war; was ennobled for his services to the king of Württemberg; and wrote a 'Text-Book of Special Pathology and Therapeutics' (1858), often republished and distinctly valuable.

**Niepcé**, *Joseph Nicéphore*, *zhō-zēf nē-sā-fōr nē-ēps*, French inventor: b. Châlons-sur-Saône 7 March 1765; d. Gras, near Châlons, 5 July 1833. He served in the French army, was administrator of the district of Nice 1795-1801, then devoted himself to chemical and mechanical studies at Châlons, and from 1811 to lithography. His researches in photography began in 1813, and by 1824 he was successful in obtaining permanent impressions of the images of the *camera obscura*. In 1826 he joined Daguerre in a further prosecution of the investigations. An article of their agreement seems to



make it clear that the real credit for the discovery of photography belongs to Niepce, and that Daguerre was merely an important aid in its development. Consult Fouqué, 'La Vérité sur l'Invention de la Photographie' (1867). See also DAGUERRE; PHOTOGRAPHY.

**Nietzsche, Friedrich Wilhelm**, German philosopher: b. Röcken 15 Oct. 1844; d. Weimar, 25 Aug. 1900. He studied philology at Bonn and Leipzig, and held the professorship of classical philology at Bale from 1869 to 1879. The next 10 years were spent at different health resorts. In 1889 he became insane and died at Weimar in 1900. His most important writings are: 'Die Geburt der Tragödie' (1872); 'Unzeitgeniässe Betrachtungen' (1873-76); 'Menschliches allzu Menschliches' (1878); 'Also sprach Zarathustra' (1883-92); 'Jenseits von Gut und Böse' (1886); 'Zur Genealogie der Moral' (1887); 'Der Wille zur Macht' (1895).

Nietzsche's theories may conveniently be divided into three periods; the first, which may be called the æsthetic period, extending until 1878; the second, the intellectual or positivistic period, until about 1883, and the third, or ethical, until 1889. The relation between these periods has been much discussed, and many critics have denied the existence of any unifying principle. On the other hand, the whole of Nietzsche's philosophy often seems an attempt to answer the question as to the nature of the chief good, and the chief radical differences in the three periods may be explained as due to changes in his standard of valuation.

(1) During this period Nietzsche accepted Schopenhauer's general standpoint, especially his emphasis upon the priority of will to intellect and his pessimism, but regarded the latter as resulting in increased artistic activity rather than in quietism. The ultimate values are those of the artist, and the two great forces in art are typified by the Greek gods, Apollo and Dionysus. The former is the dream, which, conscious of its own illusion, mirrors appearances. The latter is the intoxication that marks the breaking forth of the underlying reality. The hope of modern art lies in the union of the two in the Wagnerian opera, an estimate of Wagner later to be contradicted.

(2) With the beginning of the intellectual period, a logical rather than an æsthetic value is made supreme.

(3) The third period is by far the most important, since it contains the most characteristic and original of Nietzsche's views; and here the ultimate value is one of conduct rather than of thought or feeling. The basal reality is the will for power, a metaphysical principle which is extended from human activity to the universe, but which as such receives only vague treatment. The ethics is both negative and positive, in that it consists, first, of a criticism of existing moral distinctions, and, second, of the exposition and defense of a new moral ideal. Historically there are two moralities, each with its own set of opposites. Good and evil, the first pair, are valuations of the ruling classes, for whom everything that expresses or furthers the will of the individual is good. All that he does or likes, his passions, his ideas, all that forms a part of himself is good; while whatever is different is evil. The other pair of valuations, good and

bad, belongs, on the contrary, to the slaves, and here whatever characterizes the ruler and so is inconvenient or painful to the subject, is stigmatized as bad, while good is applied to all those qualities and actions that make life easier. It is essentially the morality of suppressed resentment; and whereas the seal of aristocratic approval is set upon the positive traits of the healthy animal, such as courage, self-assertion, and desire for unrestrained freedom, to the slave good means meekness, sympathy, and obedience. The present European standards are those of the slaves, and Nietzsche even affirms that they have become such largely through a deliberate plot of the Jews, at the beginning of the Christian era, to revenge themselves upon their Aryan conquerors by foisting upon them an ignoble standard of worth.

The aristocratic moral ideal that Nietzsche would substitute for this one takes self-assertion as its most essential characteristic. At the bottom of everything is the will for power; and all that makes for fullness of life is to be cherished, even though it overrides all our ideas of morality and of religion. The so-called virtues of pity, humility, and the like are merely symptoms of weakness and degeneracy. Strength and pride, ruthlessness toward oneself and toward others, courage and love of battle, all mark the true man, who has put behind him prejudice and tradition. For such complete affirmation of life opposition is a necessity, and a good war sanctifies every cause. The impulses should be given full play, not weakened by despicable self-denial. Altruism is an offense against delicacy, and pain alone can bring about the proud isolation that is above all pettiness. Such a view of the chief good is by no means to be called hedonistic. There is doubtless a fierce joy in battle and in all sorts of conflict; but the end proposed and reached is not happiness. Power and power alone is the good.

The two doctrines most often associated with Nietzsche's name, though they are not essential to his ethics, are those of the Superman and the Eternal Recurrence. The first is the end and justification of human struggle, and in the earlier books is represented as a mystical product of the individual will, while later it is described as a higher species with the relationship to man that man has to the ape. The Eternal Recurrence is the theory, by no means new, that present events but form a part of an infinite cycle and thus will be endlessly repeated in every detail. The final test of Nietzsche's aristocrat is his willingness to accept such repetition even of the hardest conditions. The whole attitude toward life evidently makes the pessimism of the first period no longer possible; and the new standpoint is characterized by its author as tragic optimism, namely, the view that finds life worth while not in spite of but because of its pain. Nietzsche's theories have been much discussed and have exercised an unlooked for influence, especially among men interested primarily in art or in social reform; and many consider them the logical outcome and application of Darwinism.

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## NIEVRE — NIGERIA

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**Nievre**, nê-avr, France, a central department, bounded by Yonne, Cher, Allier, Saône-et-Loire, and Côte-d'Or; area, 2,658 square miles; capital, Nevers. It receives its name from the Nièvre, a small tributary of the Loire. The soil is generally rocky and sandy, cut up by ramifications, almost always wooded, of the mountains of Morvan. There are several plateaux more or less fertile, a number of hills covered with vines, and valleys productive in pastures; but the principal wealth consists in forests and minerals. The Nièvre, whence the name of the dept., is an inconsiderable affluent of the Loire from the right. The three chief rivers—the Allier, Loire, and Yonne—are navigable, and the Yonne, which belongs to the system of the Seine, is connected with the Loire by a canal across the watershed. Of the entire area, more than 792,000 acres are cultivable land, and more than a third of the whole surface is covered with forests, the timber from which, forming one of the principal sources of wealth, is conveyed by water in great quantities to Paris, etc. About 6,000,000 gallons of wine are made yearly. Its minerals include iron and coal, and the chief manufacturers are woolen cloths, linen, cutlery, etc.

**Niflheim**, nif'hîm, in Scandinavian mythology, the region of endless cold and everlasting night, ruled over by Hela. It is separated from Muspelsheim, the kingdom of light and heat, by a huge chasm (Ginnungagap yawning gap). Here flows the spring Hvergelmir, watched by the dragon Nidhugger; this spring sends out 12 ice-rivers, from the drops of which, thawed by sparks from Muspelsheim, sprang the chaotic giant Ymir and the cow Audhumbla.

**Nigel**, nîg'el, English satirist of the close of the 12th century, sometimes called **WIREKER**. A monk at Christ Church priory, Canterbury, he wrote various verse, the most important of his poems being the 'Speculum Stultorum,' in which as in the prose work 'Contra Curiales et Officiales Clericos,' he boldly attacked the vices of his fellow-ecclesiastics. The 'Speculum Stultorum' or 'Mirror of Fools,' with its story of the ass Burnellus who wished his tail was longer, enjoyed great popularity.

**Nigella**, a genus of plants of natural order *Ranunculaceæ*, having five colored spreading sepals; 5 or 10 small two-lipped petals, with tubular claw; the carpels more or less connected together, many-seeded; leaves divided into threadlike segments, flowers solitary at the top of stem or branches. They are annuals, natives chiefly of the countries near the Mediterranean and warmer temperate parts of Asia. Some,

occasionally seen in gardens in Britain, are vulgarly known by the names *Devil in-a-bush* and *Devil-in-a-mist*. The seeds are aromatic, and somewhat peppery. Those of *N. sativa* species common in cornfields in Southern Europe, are supposed to be the *black cummin* of the ancients, perhaps the *cummin* of the Bible. The seeds of a specie of *Nigella* are much used by the Afghans for flavoring curries.

**Niger**, nî'jêr, or **Joliba**, jôl't-ba, a river of West Africa, the third in size of the African continent, known by various native names throughout its course, being the Joliba in its upper reach, the Mayo Balleo and Isa Eghirren in the central reach, and the Kwarra or Quorra in its lowest reach. The upper and central reaches are politically controlled by France, and the lower reach, through Northern and Southern Nigeria, by Great Britain. The Niger rises on the eastern slope of Mount Yenkina on the boundaries of Sierra Leone and Liberia, about 175 miles from the west coast, its headwaters being contiguous to those of the Senegal which flow in an opposite course. It flows northeast as far as Timbuktu, 300 miles above which it is joined by the Bani, a large tributary, and splits up into numerous diverging channels and lakes. After passing Timbuktu it flows east for 200 miles, then turns southeast through a rocky country past Say. At about 11° 40' N., just above Ilo, it enters British North Nigeria, at Giri being joined by the Sokoto River from the east. At Boussa navigation is impeded by dangerous rapids. Finally after a long southwestern curve to Bida, it bends more to the south and is joined by a tributary of first-class size, the Benue, or Mother of Waters, a rival in volume which has come from a source 860 miles to the east. The united stream now "passes through a series of bold picturesque hills by a narrow gorge," and eventually breaks up into one of the most remarkable mangrove-covered deltas of the world. This delta, malarious and unhealthy, covers an area of about 14,000 square miles, completely intersected by branches of the river, the principal of which, the Nun, runs through the middle of the delta. The westernmost branch, the Benin, has a bar, which presents a great difficulty to navigation. Other mouths or branches are the Bonny, New Calabar, Brass, and Forcados, distributing the Niger's waters into the bights of Berin and Biafra in the Gulf of Guinea. In its course the Niger passes through much fertile valley land, while numerous towns and villages stand on its banks, and a considerable canoe commerce is prosecuted. Slaves were formerly nearly the only article of export from the Niger, but palm oil is now the principal staple, the delta outlets being known as Oil rivers. The whole course of the river is about 2,500 miles, and the area of its basin is estimated at 584,000 square miles. Mungo Park was the first European traveler to explore any part of this river (1796-7) and was drowned in the Boussa rapids. The honors of modern exploration are divided between French, British, and German travelers. Consult: Bindloss, 'In the Niger Country' (1898); Hourst, 'Sur le Niger' (1807); Mockler-Ferryman, 'Up the Niger' (1892).

**Nigeria**, nî-jê'rî-a, or **Niger** (nî'jêr) **Territories**, West Africa, an extensive British colonial possession on the lower Niger, organized

## NIGGER CHUB — NIGHTINGALE

since 1900, within the boundaries arranged by the Anglo-German Agreements of 1885, 1886, and 1893, and the Anglo-French Agreements of 1889, 1890, and 1898. It comprises the Lagos Protectorate and Southern and Northern Nigeria, being bounded on the east by German Kamerun, and on the west and north by Dahomey and the French military territories. Nigeria includes the whole course of the Niger from a short distance above Ilo to its mouth, and also the left bank for a few miles higher up. The northern boundary runs irregularly eastward to a point on Lake Chad. Nigeria also includes the whole course of the Benue from a point above Yola to its confluence with the Niger at Lokoja. The coast-line extends from the Rio del Rey on the east, to near the mouth of the Benue River on the west, and thus includes all the mouths of the Niger. The total area is about 500,000 square miles; the mixed negro population may amount to 30,000,000, chief of which are the Fulah or Fulani of the Hausa states. For administrative purposes the territory is divided into Northern and Southern Nigeria, the boundary line being drawn due east from Owo, on the Lagos frontier. The country is mainly a level or rolling plateau, but in the central districts there are mountain ranges and isolated peaks, many of them forest-clad, of considerable elevation. The Niger and the Benue are the chief rivers, the latter being especially valuable for navigation. The Gulbin-Sokoto is a perennial left-bank tributary of the Niger, and the Waube, flowing into Lake Chad, is also of some importance. The climate is tropical, with a dry (October-May) and a wet season. During the latter the rains are often extremely heavy and accompanied by severe thunderstorms. The mean annual temperature is about 80° F., but at some periods of the year the temperature in the shade may exceed 100°. The delta lands are unhealthy, and the same may be said of much of the interior, but the climate of the elevated districts is generally quite suited to Europeans. Geologically, the region is formed mainly of granite and various metamorphic rocks, but sedimentary formations, chiefly sandstones and almost entirely belonging to the older periods, are also found. Silver, tin, antimony, lead, iron, and other minerals occur. Among the vegetable and agricultural products, most of which are exported, are cotton, indigo, palm-oil, palm kernels, ground-nuts, india-rubber, ebony, camwood, gums, and coffee. Ivory and hides are also important exports, and among the native industries leather-working deserves mention. The chief towns of Southern Nigeria are: Asaba, Onicha, Akassa, Idda, Wari, Burutu, Brass, New Calabar, Bonny Opobo and Old Calabar, all ports with custom-houses; Ado and Benin. The chief towns of Northern Nigeria, which consists mainly of the former Sokoto empire and the larger part of Bornou, are: Lokoja, at the confluence of the Niger and Benue; Kano, Sokoto, Gando, Ilorin, Yakoba, Kuka, Yola, Ilo and Katsena. The greater part of Nigeria was administered by the Royal Niger Company till 1 Jan. 1900, when it was bought out by the British government. This company was formed in 1882 as the National African Company, and four years later it received its royal charter. Most of what is now Southern Nigeria was not under the rule of the company,

but formed from 1884 till 1893 the Oil Rivers Protectorate, and from 1893 till 1899 the Niger Coast Protectorate. The kingdom of Benin was incorporated in the Niger Coast Protectorate in 1897. The company's abolition of the legal status of slavery, and its prohibition of the importation of spirituous liquors into Northern Nigeria, are to be maintained by the imperial government.

Consult: Bindloss, 'In the Niger Country' (1899); Mockler-Ferryman, 'British Nigeria' (1902).

**Nigger Chub**, or **Nigger Dick**, a dark-green chub (q.v.) of the Mississippi Valley, distinguished by the three-lobed condition of the under jaw. See CUTLIPS.

**Nigger Toes**. See BRAZIL NUT.

**Night**, in Greek mythology, Night (Nyx) was personified as a powerful goddess, who by means of sleep exercised power over men and gods. She was the daughter of Chaos, wife of Erebus, and mother of Æther and Hemera (Day), of the Fates, Sleep, Death, Dreams, Hunger, Fear, Nemesis and Strife. By day she dwelt in Tartarus enveloped in thick clouds.

**Night-ape**. See DOUROUCOULI.

**Night-blindness**, a defect of vision; nyctalopia (q.v.). See SIGHT, DEFECTS OF.

**Night-hawk**, or **Bull-bat**, an American nightjar or goatsucker (*Chordeiles virginianus*). It arrives in the northern States about the middle of May, and is crepuscular and nocturnal in habits, pursuing insects on the wing with great activity, and often at a great height in the air, frequently over towns and cities. It retires in the daylight hours to the woods, or an orchard, and sleeps sitting lengthwise on some large horizontal limb, or on a log, where its grayish mottled plumage, blending with the color of the old bark, makes it unnoticeable. When flying it often utters a harsh scream, and also, when dropping suddenly through the air, as it often does, it produces a strange booming sound. The night-hawk attains a length of 9 or 10 inches. It is blackish-brown on the upper parts, barred and mottled with grayish and buff; a large wing-spot, bar across the tail, and V-shaped blotch on the throat, are white in both sexes and is the easiest mark of recognition. The tail is forked, and is a little shorter than the wings when in repose. The gape is large and the rectal bristles are inconspicuous.

The eggs, two in number, oblong shape, and dirty bluish-white sprinkled with dark olive-brown, are produced about the middle of May, and are deposited on the bare ground in a dry situation, no nest being constructed.

**Night-heron**. See HERON.

**Night Schools**. See EVENING SCHOOLS.

**Nightingale**, nī'tīng-gāl, Florence, English philanthropist, best known for her work in the hospitals during the Crimean war, when she revolutionized army nursing: b. Florence 15 May 1820 she early became interested in hospital work, examined various hospitals through Europe, and was trained as a nurse by the Protestant Sisters of Mercy at Kaiserwerth-on-Rhine. In 1854 she went to the Crimea, having organized a band of trained nurses in a week, and established the great hospital at Scutari, where

## NIGHTINGALE — NIGIDIUS FIGULUS

she showed rare gifts of organization and heroism. Her health failed suddenly because of her severe efforts; but she refused to accept for herself the subscription of £50,000 raised for her, preferring to use it for the foundation of the Nightingale Home at Saint Thomas Hospital. She was frequently consulted by Royal Commissions in regard to field- and camp-hospitals, and gave valuable advice during the American Civil War and the Franco-Prussian war. She wrote: 'Notes on Hospitals' (1859); 'Notes on Nursing' (1860); 'Lying-In Institutions' (1871), and 'Life or Death in India' (1874). She died 13 Aug. 1910.

**Nightingale**, a celebrated song-bird of the family *Sylviidae* or Warblers. The nightingale (*Daulias lusciniæ*) is attractive for no lustre or brilliancy of plumage, the upper parts of the body being rusty-brown tinged with olive, and the under parts pale ash, blending into white at the throat and belly. Its average length is about 6 inches. In habits the nightingale is active and lively; it frequents trees of small size and bushes, and subsists chiefly upon an insectivorous dietary. It is a migratory bird, and occurs throughout Europe, but in Great Britain is limited to certain districts, so that it is never or rarely heard in Wales nor in the most western districts of England, nor in Ireland or Scotland. The song continues until the middle of June, when the young are hatched. The male bird sings during the day, and at night also and perhaps more frequently, while the female is incubating; and the flood of song poured forth in the stillness of the evening forms one of the chief sources from which the reputation of the nightingale has been derived. The nest is of rough construction. It is generally formed of leaves and grasses, and is situated mostly in damp places or in the neighborhood of water. The eggs number from four to five, and are of an olive-green color. These birds live in confinement. The bird-catchers, if possible, take the males before the arrival of the females. Birds trapped after the pairing season are said to languish and die. Another species, formerly regarded as identical with the above, is *D. philomela*, which has a more easterly distribution, extending far into western Asia. This is the bird most often referred to in literature as the Persian bulbul; and it takes a prominent place in classic mythology. Nightingales endure captivity well and are kept as cage-birds in all parts of the world. See **CAGE-BIRDS** and the authorities there mentioned; consult also Newton, 'Dictionary of Birds' (1896) and the writings of British ornithologists.

**Nightjar**, a bird of the family *Caprimulgidae* (q.v.). This name was first given to a single species, that common in the British Islands, on account of the jarring note it utters after dark; but most of the members of this nocturnal family produce similar sounds, and the term seems preferable in many respects to the erroneous designation "goatsuckers" traditionally applied to them in southern Europe and which should long ago have been abandoned. American representatives are the nighthawks, whippoorwills, and chuck-will's-widow, elsewhere described. The British nightjar is much like the American whippoorwill in appearance, and is known by many provincial names, such as dor-hawk, churr-owl, fern-owl, etc. Consult: Montagu, 'Dic-

tionary of British Birds'; White, 'Natural History of Selborne.'

**Nightmare**, a sensation of oppression or of suffocation which sometimes occurs during sleep. The sufferer experiences a short period of intense anxiety, fear, horror, etc.; feels what seems an enormous weight on his breast; is pursued by a phantom, monster, or wild beast, which he cannot escape; is on the brink of a precipice from which he cannot remove, or is perhaps, rolling down it without being able to make any exertion for his safety; and his bodily members refuse to do their office, until he suddenly awakens himself by starting up, or by a loud cry; he is then in great terror, and the body is often covered with sweat. Nightmare is generally due to repletion and indigestion, and is often superinduced by lying on the back, especially when the head is low. A person subject to nightmare should carefully observe moderation in eating and drinking, should avoid heavy meals shortly before retiring, and likewise overrich food. Alcoholic excess may lead to nervous disorders characterized by conditions, physical and psychical, which increase liability to nightmare and similar forms of disturbance. See **DELIRIUM**; **INCUBUS**; **MARA**.

**Nightmare Abbey**, a novel by Thomas Love Peacock, the hero of which is a caricature of Shelley. It was published in 1818.

**Nightshade**, any of several plants of the order *Solanaceæ*, sometimes called nightshade family, especially distinguished for toxic properties, and constituting the typical genus *Solanum*. The common or black nightshade (*S. nigrum*), an annual or biennial, with erect angular stem, ovate, sinuate-dentate leaves, drooping lateral umbels of white flowers, and globose black berries, grows as a weed in waste place in most parts of the world. It is only slightly narcotic. The leaves in a fresh state are said to be injurious to animals which eat them, but seem to lose almost all narcotic property by boiling, and are used as spinach, particularly in warm climates. The berries, though generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity, without danger. They contain, however, the alkaloid solanine found also in the shoots of the potato. Several comparatively innocuous species such as the horse-nettle or apple of Sodom (*S. carolinense*) with orange-yellow berries, are natives of the dry western portions of the United States and Canada, and one, the bittersweet, blue bindweed, felon wort, poison-flower or woody nightshade (*S. dulcamara*), is naturalized all over the eastern half of the country. (See **DULCAMARA**.) The deadly nightshade (see **BELLADONNA**) is a member of an allied genus, whose toxic principle is atropin (q.v.).

**Nigidius Figulus**, Publius, Roman scholar: b. about 98 B.C.; d. 44 B.C. He took part in political affairs during the closing days of the Republic; became prætor in 59 B.C.; and having sided with Pompey in the civil war was compelled by Cæsar to live in exile. In philosophy he was a Pythagorean; and for the scope of his learning he was ranked by Aulus Gellius next to Varro (q.v.). His fame as an astrologer was great, and in the 'Chronicle' of Eusebius he is styled "Pythagoricus et magus." Gellius complains of the obscurity and

subtlety of Figulus' writings, but the examples he adduces in proof are not thought by critics to support the assertion. The fragments extant have been edited by Swoboda (1889). Consult also Röhrig, 'De Nigidio Figulo' (1887).

**Nigrida**, nī-grīsh'ī-ā. See **SUDAN**.

**Nihilism**, from the Latin *nihil* (a trifle, nothing), the state or condition of nihility, being nothing. A general term used to define a Russian socialistic movement, and a name also applied in metaphysics to the doctrine that refuses a substantial reality to the existences of which man is conscious. In Russia the word Nihilist was first applied by Ivan Tourgenieff to the hero of his novel 'Fathers and Sons,' who was intended to be the personification of a movement in Russia for the emancipation of women, the independence of children, and the spread of natural religion.

**Doctrine of Nihilism**.—Followers or believers in Nihilism are those who disbelieve in any improvement in the social condition of progress of man; particularly members of any association devoted to the work of destroying the present form of the Russian government without any hope or definite theory of substituting another government in its place. Nihilism appears to have permeated every stratum of Russian society, and its recruits and followers are gathered from every social grade, alike from the nobility, the army and the peasants.

**Early History**.—As early as 1818 a party of freedom, so-called, was organized in Russia, and on 14 Dec. 1825, occurred the rising of the Decembrists among the officers and soldiers of the army. These revolutionists aimed at the emancipation of the serfs and the introduction of constitutional government. The revolt was quelled, and six of the leaders were executed and 125 others imprisoned or exiled. About 1850 liberal ideas received an impetus from the study of socialistic writers of other countries. On 23 April 1849, some 40 persons were arrested who belonged to an association formed by Petrashevsky, an official of the Foreign Office. These were sentenced to death, but the sentences were commuted to imprisonment and banishment. In 1857 Alexander Herzen founded a journal, the 'Kolokol,' in London, which had a remarkable influence upon the Russian youth. In the same year there arose in Russia a movement, under the leadership of Tschenshevsky, which criticised existing society. In 1864 he published a novel entitled 'What is to be Done?' which proved a revolutionary firebrand among the peasantry. Another writer, Shapoff, urged the introduction of self-government and local autonomy. Numerous organizations sprang up in the universities, and in 1863 the various secret associations united under the name of 'Land and Freedom.' In 1868, Bakunin commenced the publication of a newspaper in Geneva. In this journal he advocated the total abolition of the state and the substitution of small communes.

**The Socialistic Propaganda**.—In the early part of 1870, a number of young men and young women of the upper classes voluntarily went to work in the fields and the factories so as personally to carry on a Socialistic propaganda and distribute Socialistic literature. Their organs were the 'Forward' of London and the 'Workingman' of Geneva. This work continued about

six years, during which time there were 23 political trials of 417 persons, half of whom were condemned to exile in Siberia or to hard labor in the mines. During this period there existed a more moderate party, but it failed to satisfy the demands of the young men of the universities. In 1875 the 'Narodniki' became a prominent organization. The government became active, and during 1876 and 1877 the prisons were filled with propagandists.

**The Party of Removal**.—In 1877, former adherents of the Nihilistic movement organized a new and stronger secret party, which aimed at the removal by force of crowned heads, and a warfare against the government. On 24 Jan. 1878, a young woman of 28, named Vera Zasulich, shot at General Trepoff, who had caused a prisoner to be whipped for refusing to take off his hat to him. She was tried before a jury, and strangely enough, was acquitted. The government was enraged and had the verdict annulled. On 4 Aug. 1878 General Mesentzoff was killed, and 22 Feb. 1879, the Governor of Kharkov, Prince Kropotkin, was assassinated. On 2 April 1879, an attempt to assassinate the Emperor, Alexander II., was made by Solovieff. He was captured and hanged. Alexander II. (q.v.) was assassinated 13 March 1881.

**The Will of the People**.—Some time later at a secret congress held at Lipetsk, the acquisition of political freedom was declared to be the first necessity. It was hoped to gain this by the formation of a legislative body, elected by the people, with guarantees for electoral independence, and liberty to agitate for reforms. This was demanded from Alexander III. (q.v.) shortly after the assassination of his predecessor as the price of cessation from violence. This new party, the 'Narodnaia Volia,' or 'Will of the People,' sought to overthrow despotism by the communistic instincts of the peasants. It set forth the following demands: (1) A representative assembly having supreme control in state matters; (2) provincial self-government with elective officers; (3) village communes; (4) freedom of conscience, press, speech, association, and political agitation; (5) suffrage; (6) a national militia instead of a standing army; (7) nationalization of land; (8) measures to socialize factories. This movement proved a total failure and the party collapsed in 1885.

**Latter-Day Conditions**.—The present condition of Nihilism in Russia has been likened to a sleeping volcano. There have been no successful outbreaks nor assassinations although the secret party is said to exist in larger numbers than ever before. Within recent years the discoveries of the police show that Nihilism is widely spreading in Russia, not only among the working classes but among the aristocracy, and even in the army, especially in Saint Petersburg, and in many of the principal cities and towns. Secret affiliations are known to exist between the Russian Nihilists and the French and Italian anarchists.

**Bibliography**.—Kennan, 'Siberia and the Exile System' (1891); Krapotkin, 'Memoirs of a Revolutionist' (1899); Stepniak, 'Underground Russia' (1883); Tikhomiroff, 'Russia, Political and Social' (1887); and 'Russia under the Tsars' (1885).

**Nihilist**, in theology, one who taught 'Christus, secundum quod est homo, nihil est.'

that is, the human nature of Christ had no existence, so far as it could be called his. In other words Christ did not become anything different from what he was before, by assuming human nature, because no change can be wrought in the unchangeable God, and a man is not to be called a cloak because he puts one on. This was the view of Abelard, and John of Damascus, and was held to be tenable, at least, by Peter Lombard (see LOMBARD, PETER). It was condemned in the Lateran Council of 1179.

**Nihongi**, *nē'hōn-gē*, a Japanese historical work embracing records of ancient Japan. It was first issued in 712 and was fashioned on the model of Chinese histories.

**Niigata**, *nē-ē-gā'tā*, Japan, a seaport city, capital of the province of Echigo, on the west coast of the island of Hondo, nearly opposite the island of Sado, at the mouth of the Shinanogawa. It was one of the treaty ports opened in 1859, but owing to its unsuitable harbor, its foreign trade is nominal; its coasting and internal trade, however, is important and increasing, the province being rich in petroleum and minerals, and agriculture being well developed. Pop. about 60,000.

**Nijmegen**, *nī'mā-hēn*. See NIMWEGEN.

**Nijne-Tagilsk**, *nēzh'nē-tā-gilsk'*, East Russia, the chief town of the Ural Mountains mining region in the government of Perm, on the Tagil, 135 miles east of Perm. Its chief industrial establishments are the ironworks founded by Demidoff; iron, gold, copper, and platinum are mined in the surrounding district, which has a population of about 30,000.

**Nijni-Novgorod**, *nēzh'nī-nōv'gō-rōd*, or **Nizhni-Novgorod** ('Lower Novgorod'), Russia, a government bounded north by the governments of Kostroma and Viatka, east by Kasan and Simbirsk, south by Penza and Tamboff, and west by Vladimir; area, 19,704 square miles. The capital is Nijni-Novgorod (q.v.). The surface forms an extensive plain, occasionally broken and diversified by low undulating hills. These hills are almost invariably composed of limestone, which is largely developed over the whole government. The only metal found is iron; gypsum prevails in every quarter. The entire government belongs to the basin of the Volga, which, entering it on the northwest, and traversing it in one vast curve to the east, drains a considerable portion of it directly, all the other drainage being brought to it by the Oka and its tributaries on the west, the Sura and its tributaries on the east, and the Senets and Vetluga on the north. The soil is of remarkable fertility, rendering this government the granary of Russia. The principal crops, in addition to the ordinary cereals, are hemp and flax. Much attention also is paid to the production of fruit. The extent of forest is equal to that of arable land, and there are tracts of excellent timber. Both manufactures and trade have made great progress. Several governments possess much larger establishments, but in none is the spirit of activity and enterprise more universal. The principal manufactures are coarse cloth, canvas, cordage, glass, soap, and leather. The same articles form important branches of trade, which includes besides corn, flour, hemp, and flax, iron and ironmongery, etc. The central position of this government, and its large navigable

streams are highly favorable to its trade. Pop. about 1,750,000.

**Nijni-Novgorod**, **Nizhni-Novgorod**, or simply **Nijniy**, Russia, the capital of a government of the same name, at the confluence of the Oka and Volga, 225 miles east of Moscow. It is of world-wide celebrity in connection with its great commercial fair which has been held here annually since 1816, lasts from 15 July to 1 September, and is attended by an average of 250,000 dealers and visitors, from all climes between Germany and China. There is an upper city containing the Kreml, a lower city, and a suburb. The Kreml, finely situated on the loftiest point of the high town, is surrounded by a lofty wall flanked with towers, round or square, and contains the principal edifices, particularly two cathedrals, the governor's palace, and an episcopal seminary. With the exception of these, the elegant church of the Holy Women, and a few other public edifices, the whole town is built of wood, and possesses little interest. It is, however, becoming noted, also, for its educational institutions, including schools, libraries and museums. For the convenience of those frequenting the fairs there is an enormous market hall, an electric street railroad, and 60 blocks of buildings for booths, containing more than 2,500 apartments separated by fireproof walls. The value of goods sold at one of these fairs often exceeds \$90,000,000. At these fairs all foreign goods are supplied in smaller quantities, those of Russian production showing an increase. Nijni-Novgorod, founded in 1221, was devastated on several occasions by the Tartars; its prosperity dates from 1816 when the great fair was removed to Nijni-Novgorod from Makarieff, after a great fire. Pop. (1897) 95,124.

**Nika Riot**. See JUSTINIAN I.

**Nike**, *nī'kē*, in Greek mythology, the goddess of victory: called by the Romans Victoria. In art she is generally represented as a winged female figure. Her attributes are a palm branch, a garland and sometimes a herald's staff.

**Nike Apteros**, or **Athene Nike**, a small but beautiful Doric temple standing on a bastion flanking the entrance to the Athenian Acropolis. It was torn down by the Turks in the 17th century.

**Nikisch**, *nē'kīsh*, **Arthur**, Hungarian orchestral conductor: b. Szentmiklos, Hungary, 12 Oct. 1855. He studied violin, composition and piano under Hellmesberger, Dessoff, and Schenner, respectively, in the Vienna Conservatory; was first violin in the Vienna Royal Opera orchestra for a year; and then in 1878 became musical director of the City Theatre of Leipsic. He directed the Boston Symphony Orchestra 1880-93, the Royal Hungarian Opera in Budapest 1893-5, and the Philharmonic concerts in Leipsic from that date up to the present. In Leipsic he conducts the famous Gewandhaus concerts. Nikisch wrote 'Die Christnacht,' and other music. Consult the study by Pfohl (1900).

**Nikita**, *nē-kē'tā*, **Louise**. See NICHOLSON, LOUISA MARGARET.

**Nikolaieff**, *nē-kō-lī'ēf*, or **Nicolaiev**, Russia, a seaport, and the chief naval station on the Black Sea, at the confluence of the Ingul and Bug, 36 miles northwest of Kherson. It occupies a large space, is fortified and well built,



with wide streets and a finely planted boulevard. It is administered by a governor, who is also commander-in-chief of the Black Sea fleet. It was founded in 1791, and since its connection with the Russian railway system its trade and importance have vastly increased. Pop. about 100,000.

**Nikon**, nē'kōn, Russian patriarch and primate: b. 1605; d. 17 Aug. 1681. Having become a priest and a monk, he was appointed (1646) by the Czar Alexis Mikhailovitch to be archimandrite of the Novospasky monastery in Moscow. He was made metropolitan of Novgorod in 1648, and in 1652 became patriarch of Russia. In 1666 he was deposed and banished to a monastery. He died while on his way, by imperial permission, to the monastery of the Resurrection of Christ, which Nikon himself had built, and where he had gone into temporary retirement in 1658. He introduced reforms into the service of the Church, upheld monasticism, lived a life of exemplary devotion, and aimed at educational and social advancement of the people.

**Nile Group**, a marble statue of the Alexandrine period now in the Vatican. It shows a half reclining figure of a vigorous man representing the river Nile; he leans with his left arm on a sphinx; climbing over him are naked chubby children, intended, it is supposed, to typify the height to which the flooded river rises, namely, 16 cubits. The execution of the group is fine, and the whole treatment is peculiarly Alexandrine. The group was found at Rome near the church of Minerva, in the vicinity of a temple of Isis; but it was subsequently removed to the Vatican by the order of Pope Leo. X.

**Nile**, a river of northeast Africa, celebrated from remote antiquity as the Egyptian Hope or Aur-Aa—Great River, the Hebrew Sihor, and the Greek Νεῖλος, the largest river of the African continent, and the second in length of the rivers of the world. Its length is estimated at 4,000 miles, and the area of its basin at 1,082,000 square miles, extending through 35 degrees of latitude, or 2,450 miles in a direct line. The White Nile or Bahr-el-Abiad flows from Victoria Nyanza, and is joined at Khartum by the Blue Nile or Bahr-el-Azrek which has its source in the Abyssinian Mountains. The principal feeder of the Victoria Nyanza and the head stream of the Nile proper is the Kagera, formed by three tributaries, the chief of which is the Nyavarongo, which rises in about 2° 30' S. at an altitude of about 7,000 feet; the Kagera flows through a delta into Victoria Nyanza just north of 1°. Other influents are the Katonga from the west, the Nzota from the northeast, the Morao and Ruvano from the east. The great river which flows out of Victoria Nyanza in the north at about lat. 0° 30' N., and lon. 33° 40' E., before its identity with the Nile was known, was called the Kari or Somerset River. At its outflow from the lake it forms the unimportant Ripon Falls, then flows northwest, and about lat. 1° 40' N. expands into Lake Ibrahim Pasha, discovered in 1874. On again contracting to the dimensions of a river it flows first west then northeast to lat. 2° 15' N., where it forms the Falls of Karuma. It then turns west, and after forming

the Murchison Falls, enters, at the town of Magungo, the Albert Nyanza, at an elevation of about 2,550 feet. Magungo lies on the east side of the lake, close to its northeastern extremity, and exactly at this latter point, about lat. 2° 35' N. and lon. 31° 22' E., the river again leaves the lake, flowing in a northerly direction. Above Gondokoro, a town lying about lat. 5° N., the river forms a series of cataracts, and till 1876 the part of the river lying between these cataracts and the Albert Nyanza was never fully explored. In that year under the direction of Colonel Gordon a steamer was carried in pieces round the cataracts to Dufile, and on 7 March Romolo Gessi started thence to sail up the river, and on the 18th of the same month reached the Albert Nyanza. The whole of this part of the river, 164 miles long, is navigable, deep, and broad, in many places with a breadth of upward of 700 yards.

Not far below Gondokoro, which is nearly due north of the outlet of the Albert Nyanza, the Nile begins to flow more to the west till it reaches lat. 9° N., where it receives the Bahr-el-Ghazal, the most important of the tributaries that flow into it from the left bank. On receiving this affluent it turns due east for about 100 miles, and then after receiving the Sobat from the southeast, a very important river draining the country between Abyssinia and the Victoria Nyanza, flows almost due north to Khartum. Here it is joined from the east by the Blue Nile or Bahr-el-Azrek, the source of which was discovered by Bruce in 1770 in the Abyssinian highlands, in lat. 11° N.; lon. 36° 30' E. It flows first north into Lake Dembea or Tsana, then emerges from it in an easterly direction, describes a great arc to the south, extending below lat. 10° N., then turns to the west, after some distance receives its southern tributary, the Dedhesa, and lastly takes a northerly course. After receiving from the east the rivers Dender and Rahad, it joins the White Nile at Khartum. The united Nile then flows first to the northeast till at lat. 17° 30' N. it receives its last tributary, the Atbara, from the Abyssinian frontier. From its junction with the Atbara the Nile flows north, having on the west or left bank the desert of Bahiûda; on the east Mekheyr, which is commonly called Berber. Lower down it forms several islands, one of which bears the name of Kandake (Candace), and also one or more cataracts, it then bends west by south, and passes by Jebel Barkal, where stand the remains of a temple, repaired by Tirhaka (700 B.C.), but probably 1,000 years older. Resuming its northern course it enters the plains of Dongola, and forms several islands of great extent. Quitting these plains by a cataract the river flows through the districts of Mahas, Sukkot, Wadi, Kenûz, and Batn-el-Hajar (or the Glen of Rocks), at the head of which is the second or great cataract, and entering Egypt at Philæ—the Pi-lakh or limit of the Egyptians—it descends the lowest (in ascending the first) cataract to Syene or Assouan, which is in lat. 24° 5' N. From Philæ, lat. 24° 3' N., the Nile flows through Egypt in a single stream as far as Batn-el-Bakara, the ancient Cercasorum, at the head of the Delta, in lat. 30° 15', where it divides into two branches, leading down respectively to Rashid (Rosetta) and Dimyat (Dam-

NILE.



1. Rapids of the first cataract.
2. Nile boats near Cairo.



ietta), and entering the sea in about lat. 31° 35' N. These two mouths correspond, as is supposed, to the Phatnitic and Bolbitinic mouths of the ancients, which, however, in ancient times were not so important as the Pelusian mouth on the east and the Canopic on the west, between which, proceeding from east to west, there were other five mouths, named respectively the Tanitic, Mendesian, Phatnitic or Bucolic, Sebenitic, and Bolbitinic.

The Nile received divine honors from the Egyptians, and at a later period also from the Greeks and Romans. By the Egyptians he was represented as a hermaphrodite, with a beard and woman's breasts, and a skin of a blue color. The Upper Nile was distinguished from the lower by a peculiar floral symbol. The Nile had a temple dedicated to himself at Nilopolis, and his principal festival is mentioned under the name of Niloa. In Greek and Roman art he is depicted in the attitude of a river god reclining, around whom sport 16 children, an allegorical representation of the height in cubits of the inundations of the river.

As rain scarcely ever falls in the valley of the Nile from the 18th nearly to the 30th parallel, and very scantily even lower down, the river owes its supplies wholly to the copious rains of the countries wherein it rises. In Egypt it begins to increase in June, attains its greatest height in three months, and then subsides as gradually as it rose. The ordinary rise at Cairo is about 25 feet. During the flood a great portion of the Delta and of the valley of Egypt higher up, is inundated. In Sennaar also, and Dongola, extensive tracts are watered immediately by the river; but, in general, the banks of the Nile above Egypt are irrigated by means of the water-wheel. In early times the case was different, as is shown by the composition of the soil formed of alluvial deposits in places no longer reached by the stream, even in its highest state of flood. The changes of level which have taken place in relation to the river are demonstrated by the hieroglyphic inscriptions at Semneh, a day's journey beyond the second cataract, which attest that 4,000 years ago the average height of the Nile at its utmost flood was 23 feet higher than at the present day, while inversely the yearly inundations of the river in Egypt are continually raising the level of the whole surrounding valley.

The Nile reservoir, for which the great dams at Assouan and Assiout have been constructed, will enable wide tracts of land to bear two crops a year instead of one, will bring waste districts into tillage, and will greatly increase the area of sugar cultivation. The reservoir will supply 1,000,000,000 cubic metres of water annually. See article and illustration under ASSOUAN, Vol. II.; also EGYPT; IRRIGATION.

**Niles, Hezekiah**, American publisher: b. East Bradford, Chester, Pa., 10 Oct. 1777; d. Wilmington, Del., 2 April 1839. From 1800-5 he was engaged in the publishing business in Wilmington, Del., then moved to Baltimore, Md., where with George Bourne he edited and published the *Evening Post*. In 1811 he founded 'Niles' Register,' a weekly journal, which in 1837 he moved to Washington and published under the name of 'Niles' National Register.' While in Washington he obtained a position in the Pension Office, and gave up the editorship

of the 'Register,' which was moved back to Baltimore in 1838 and continued by his son and others till 1849. He published: 'Quill Driving,' a series of humorous essays; and 'Principles and Acts of the Revolution' (1822). The 'Niles' Register' was devoted chiefly to the discussion of politics, and is regarded as one of the most valuable sources for the study of the American history of the period; the volumes for 1812-27 have been reprinted.

**Niles, John Milton**, American journalist and politician: b. Windsor, Conn., 20 Aug. 1787; d. Hartford, Conn., 31 May 1856. At 20 he began the study of law, and in 1817 settled in Hartford, Conn., where with the co-operation of others he established the *Hartford Times*, of which he was principal editor for several years, and to which he contributed for 30 years; through this paper he warmly supported Andrew Jackson and the Democratic party. Appointed postmaster of Hartford in 1829 he resigned on receiving the executive appointment to the United States Senate, a post which he retained till 1839. In 1839 and 1840 he was Democratic candidate for governor of Connecticut, and in the latter year was postmaster-general under President Van Buren. He was again elected to the Senate in 1842, and on the expiration of his term in 1849 retired from public life. He published 'The Independent Whig' (1816); 'Gazetteer of Connecticut and Rhode Island' (1819); 'Life of Commodore Oliver H. Perry' (1820); 'History of South America and Mexico, and a view of Texas' (1839); 'The Civil Officer' (1840); etc.

**Niles, Nathaniel**, American statesman: b. South Kingston, R. I., 3 April 1741; d. West Fairlee, Vt., 31 Oct. 1828. He was graduated from Princeton College in 1766 and subsequently studied medicine, law, and theology, and he preached in various Congregational churches in New England. He settled in Vermont after the American Revolution and there conducted religious services in his own house for nearly 40 years. He served in the Vermont legislature and was its Speaker in 1784, was a judge of the State supreme court and was a member of Congress in 1791-5. As 'censor' he assisted in the revision of the State constitution and he was six times presidential elector. He wrote the popular war song 'The American Hero' after the battle of Bunker Hill and published: 'Four Discourses on Secret Prayer' (1773); 'The Fountain of Good' (1777); etc.

**Niles, Nathaniel**, American lawyer: b. South Kingston, R. I., 15 Sept. 1835. He was educated at Phillips Andover Academy and was admitted to the bar in 1857. He has served for several terms in the New Jersey legislature of which he was Speaker in 1872 and where he has introduced important measures, notably those establishing 1,200 free school libraries and a free school fund of \$3,000,000.

**Niles, William Woodruff**, American Protestant Episcopal bishop: b. Hatley, P. Q., 24 May 1832. He was graduated from Trinity College, Hartford, Conn., in 1857 and from the Berkeley Divinity School at Middletown, Conn., three years later. Entering the Episcopal ministry in 1861 he was rector at Wicasset, Maine, 1861-4, and at Warehouse Point, Conn., 1868-70. He was for six years professor of Latin at

Trinity College, and in 1870 was consecrated bishop of New Hampshire.

**Niles, Mich.**, city in Berrien County; on Saint Joseph River, and on the Michigan C., and the Cleveland, C., C. & St. L. R.R.'s; about 110 miles southwest of Lansing and 90 miles east of Chicago, Ill. Niles is in the region traversed by the earlier explorers who followed the rivers which were inlets and outlets of the Great Lakes. The French missionaries founded here a mission in 1697. On the site of the city, or nearby, was Fort Saint Joseph, the ruins of which are still in existence. In 1782 Spain claimed the land for miles around Niles on account of the capture, in 1781, of this fort by a force of Spanish soldiers. In 1828 a colony of eastern home-seekers located at Niles; in 1838 the village was incorporated, and was chartered as a city in 1859.

Niles is the commercial centre of a productive agricultural region, and its good water-power has made it a manufacturing city. The chief manufactures are windmills, flour, lumber, paper, lithographs, furniture, steel tanks, and dairy products. There is considerable trade in farm products, fruit, and the manufactured articles. The government is vested in a mayor, who holds office one year, and a council. The city owns and operates the electric-light plant and the waterworks. Pop. (1910) 5,156.

**Niles, Ohio**, city in Trumbull County; on the Mahoning River, and on the Baltimore & O., the Erie, and the Pennsylvania R.R.'s; about 50 miles southeast of Cleveland. It is a manufacturing centre; the chief manufactures are mine and mill supplies, galvanized iron, foundry and blast furnace products, automatic presses, boilers, electric and steam cars, chinaware, incandescent lamps, metal lath, iron roofing, sheet iron, and tin. The government is administered under a charter of 1895, and provides for a mayor, who holds office two years, and a council. The electric-light plant and waterworks are owned by the city. Pop. (1910) 8,361.

**Nilgai**, a large bluish-gray antelope (*Boselaphus tragocamelus*) of the plains and less forested parts of India, where it forms one of the principal game animals of the country. The short conical horns and general appearance of the head and body are somewhat ox-like; but the legs are long and slender, and a large tuft of hair depends from the chest. Nilgai both graze and browse, feed during the day, and are able to thrive with very little water. Where they are not much hunted they become so tame as to be troublesome to visitors; but when much disturbed grow shy and wary. Their chase is therefore often interesting, but the small horns make so poor a trophy that they are not often shot. The best sport is obtained by running them down on horseback and killing them by spearing. Consult works on East Indian zoology and sport, especially Kinloch, 'Large Game Shooting' (1895), and Baker, 'Wild Beasts' (1890).

**Nilgiri**, nīl-gē'rē, or **Neilgherry, Hills**, India, a southern range of Madras, giving its name to a district, and owing to its great elevation, delightfully cool climate, much resorted to by invalided Europeans resident in India, the principal health-station being Ootacamund. The hills rise abruptly from the plains 40 miles from

the west coast, to an average height of 6,000 feet, individual peaks shooting up to 8,760 feet. The mass is isolated, with the exception that a precipitous granite ridge leaves its western face and connects with the Western Ghāts. The surface consists of grassy uplands with large groves of forest trees; but the lower slopes are heavily timbered. Coffee, tea, and cinchona are cultivated. The Nilgiris are inhabited by five distinct tribes, of whom the Todas are the most interesting. They speak a Dravidian dialect and practise polyandry. The men are tall and athletic, with Roman noses, black bushy beards and eyebrows, but they are dirty in their habits. Their sole occupation is tending cattle. The Nilgiris district has an area of 597 square miles; pop. about 115,000.

**Nilometer**, in hydraulics, an instrument for measuring the rise of the Nile during its periodical floods. On the island of Er-Ródah is a graduated pillar, upon which the height of the water is read off. The pillar stands in a well which communicates with the river. In the time of Pliny, a height of 12 cubits meant famine, 13 scarcity, 15 safety, and 16 plenty. At present the canals are cut and distribution commences when the river reaches 18 cubits; 19 cubits is tolerable, 20 adequate, 21 excellent, 22 abundant, and 24 ruinous. See NILE, THE.

**Nilsson, nīl'són, Christine**, Swedish operatic soprano; b. Hassaby, near Wexjö, Sweden, 3 Aug. 1843. She was educated for the operatic stage by Berwald at Stockholm, and Massé and Wartel at Paris. In 1864 she made her first appearance as Violetta in 'La Traviata' at the Theatre Lyrique, Paris; and she appeared in 1867 in that role for the first time in England at London. She sang in the United States in concert in 1870, in opera in 1871; and appeared there again in 1873-4 and 1882. She was last heard in New York on 16 April 1883. Among her most famous impersonations are Ophelia in Thomas' 'Hamlet,' and Margaret in Gounod's 'Faust'; Elvira in 'Don Giovanni' and Elsa in 'Lohengrin.' In 1872 she married M. Auguste Rouzaud, who died in 1882; and in 1886 she married Count A. de Miranda. Since 1888 she has lived in retirement. Her voice was a soprano of moderate power, but very brilliant and even.

**Nimapu**, nīm'a-poo. See SAHAPTIAN INDIANS.

**Nimbus**, (1) in painting, the halo or collection of rays with which artists surround the heads of sacred persons, in Christian art, of Christ, and the angels and saints. The use of this ornament is both ancient and widespread, being exemplified in the Indian, Egyptian, Etruscan, Greek, and Roman religions. The ancient poets speak of their deities as being crowned with such a nimbus in their occasional appearances on earth, and in paintings this nimbus was represented in the same way as in the paintings of Roman Catholic artists. The nimbus of Christian art is usually circular in form, but sometimes it is triangular; sometimes in the form of three rays, one proceeding from the summit of the head, and the other two from the sides, so that the three form three arms of a cross. The triangular nimbus symbolizes the Trinity; it is sometimes enclosed in a circle, which symbolizes eternity. The nimbus with three rays

is also a symbol of the Trinity. Another form of the nimbus is that in which one of the common circular shape supports a cross. (2) In meteorology, the word is applied to a rain cloud; sometimes classed as if forming a primary or fundamental variety of cloud; it is really a mixture of the stratus, the cumulus, and the cirrus. It has a uniform gray tint and fringed edges.

Nimeguen, nīm'ā-gēn. See NIMWEGEN.

Nîmes, nēm, or Nîsmea, France, a southeastern city, capital of the department of Gard, 62 miles northwest of Marseilles, noted for its ancient buildings and monuments of Roman origin, which are second only to those of Rome. It is situated in a delightful plain, and handsome boulevards occupy the site of the former ramparts. The city proper is small and irregularly laid out, with narrow streets and ill-built houses; but its three suburbs, one of which, called the Cours-Neuf, is larger than the city itself, present a finer aspect, having wide, straight avenues, fine public walks, and handsome buildings. Among the edifices of the Christian era are the cathedral, begun in the 11th century, but constructed chiefly in the 16th and 17th, occupying the site of a temple of Apollo; the church of St. Paul; the new palace of justice; the general hospital; the Hôtel Dieu, rebuilt in 1830; the public library; the central house of detention, which is the citadel built by Vauban over the remains of the old Fort Rohan erected in 1629 by the Calvinists; and the fine monumental fountain by Pradier, erected in 1851, on the esplanade. The public garden, where is still to be seen the fountain that furnished the Roman baths with water, and the beautiful promenade known as the Cours Feuchères, are also attractive features. Nîmes is the seat of a Roman Catholic bishop, of a Protestant consistory, and has tribunals of primary jurisdiction and commerce, a departmental academy, several learned institutions, a lyceum or college, a normal school, a theological seminary, schools of drawing, chemistry and physics, geometry and mechanics as applied to the arts, a society of medicine, a Bible society, and a museum of natural history.

The monuments of the Roman period are the Maison Carrée, so called from its rectangular form, a beautiful Corinthian temple nearly in the centre of the city. It stands on a stylobate, and is approached by 15 steps; the platform is 82½ feet long and 40¼ feet wide, and the building and platform together are 58½ feet high. It is surrounded by 30 columns, 10 of which are detached and form the portico. It suffered greatly during the Middle Ages, but since 1789 it has been taken care of, restored, and surrounded by an iron railing. In 1823 it was converted into a museum of paintings and antiquities. The amphitheatre, or Les Arènes, is the most perfect of its kind extant. Its height outside is from 68 to 104 feet, and its external circumference 1,174½ feet. It has from 32 to 35 ranges of seats, and was capable of accommodating from 17,000 to 23,000 spectators. It was used as a fortress by the Visigoths and the Saracens, when attacked by the Franks; during the following centuries it was also occupied as a stronghold. No fewer than 2,000 persons had established their abode within the walls of this building,

when in 1809 it was cleared by order of the prefect; and it has since been protected against encroachments. The Tour Magne (*turris magna*) is the remnant of a tower which flanked the ancient walls. The boulevards now occupy the site of the ramparts, but portions of them are still extant in the Porte d'Auguste and Porte de France, two Roman gates, the former of which is ornamented with sculptures. To these monuments must be added a ruined *nymphæum*, a fane dedicated to the nymphs, which communicated with a neighboring bath for women, the remains of which have been mistaken for those of a temple of Diana. The magnificent aqueduct, known as the Pont du Gard, is in the vicinity of Nîmes. (See GARD, PONT DU.)

In point of industry and commerce Nîmes holds a distinguished rank; it is the great southern mart for raw and manufactured silk. Its manufactures are principally silk shawls and hosiery; mixed silk, cotton, and woollen stuffs; blonde lace and tulle, galloons, ribbons, and carpets. There are several large dyeing and printing establishments, vinegar factories, and distilleries. Its trade is mostly in wine, brandies, vinegar, essences, and oil.

Nîmes is supposed to have been built by a Greek colony, and was afterward for about 500 years in the possession of the Romans. In the 16th century it became a stronghold of Calvinism, and suffered much during the civil wars. The treaty known as the Pacification of Nîmes, concluded here in 1629, granted freedom of worship to the Huguenots, but deprived them of their fortified towns. In 1815 it was the scene of religious violence, in consequence of the reaction of that period. Guizot and Daudet were natives of this town.

Nimra'vus, a genus of large Tertiary fossil cats, typical of the family *Nimravidae*, or *Macharodontidae*, which includes the various sabre-toothed tigers (q.v.).

Nim'rod, according to the Mosaic scriptures, the founder of the Babylonian monarchy, son of Cush. He flourished about 2450 B.C. He is styled a mighty hunter "before the Lord," a somewhat vague expression, but evidently referring to battle and conquest as well as to the chase. All that is definitely known about Nimrod is that he was a Cushite, that he established a kingdom in Shinar, the classic Babylonia, the chief towns being Babel, Erech, Accad, and Calneh, that he extended his kingdom northward along the Tigris over Assyria, where he founded a second group of capitals, Nineveh, Rehoboth, Calah, and Resen. In the Chaldean epic of the deluge Nimrod has by some scholars been identified with Gilgamesh, the heroic figure whose story is dated about 2200 B.C. Consult: 'Variorum Aids to the Bible Student' (1898).

Nimrud, nīm'rood, Asiatic Turkey, the name given to a mound which is supposed to be the site of an ancient Assyrian city; on the east bank of the Tigris River at the confluence of the Tigris and the Zab Ala; and 18 miles below Mosul. It is supposed to be the city Calah, mentioned in Genesis x. 11, a suburb of Nineveh. See NINEVEH.

Nimwegen, nīm'wā-gēn, or Nimeguen, nīm'ā-gēn (ancient *Noviomagus*; Dutch, *Nijmegen*), Netherlands, city in the province of Gelderland; on the Waal, about 12 miles south of



**Arnheim.** Built in the form of an amphitheatre, on a series of hills, it overlooks a beautiful valley. It is in a productive agricultural region in which grain and grapes are prominent productions and much attention is given to stock-raising. The chief manufactures are leather, tin, wine, eau de cologne, flour, and cigars. It has an extensive trade in wine, grain, and cattle.

**Nimwegen** possesses many ruins showing its Roman origin. It was originally a Roman camp by means of which control was exercised over the Teutons living northeast of the Rhine. It was one of the Hanse towns. From 1585 for nearly 100 years it was the scene of much of the contentions, and also of the peace-makings among the Spaniards, Swedes, French, and Dutch. The "Peace of Nimwegen" in 1678-9, was the ending of the contest between the French and the Dutch, the great event in the life of Louis XIV. It marked the time when France became one of the Great Powers.

**Ninde, William Xavier,** American Methodist bishop: b. Cortland, N. Y., 21 June 1832; d. Detroit, Mich., 3 Jan. 1901. He was graduated from Wesleyan University, Middletown, Conn., in 1855, and was for a time engaged in teaching, receiving ordination in 1856. He was in charge of various churches in Ohio and in 1870 was transferred to the Detroit conference. He accepted the chair of practical theology at Garrett Biblical Institute, Evanston, Ill., in 1873; in 1879-84 he was president of the Institute. In 1884 he was elected bishop. He was the first president of the Epworth League.

**Nindemann, Wilhelm Friedrich Carl,** German-American Arctic explorer: b. Gingst, Germany, 22 April 1850. He removed to the United States in 1867 and in 1881 accompanied the Polaris expedition. When the Polaris was caught in the ice he with 18 of the crew drifted on an ice-floe for seven months. They were rescued by the Tigress in 1873 and he subsequently joined the crew of the Jeannette and when the vessel was lost was despatched for aid in 1881 by Captain De Long. He assisted in the search for De Long and his companions, whose bodies were discovered the next year. He published 'Eines deutschen Matrosen Nordpolfahrten' (1885).

**Nine-bark,** an American shrub (*Opulasta opulifolius*), of the rose family, common throughout the eastern part of the United States. It has an ungainly form, glabrous twigs, bright green, three-lobed, crenate-lentate leaves, and small white or purplish flowers in terminal corymbs. Its bloom, remarks Mrs. Lounsberry, is not very pretty, but it redeems itself by the beauty of the ripening pods. "They, hanging in quantities at the ends of its long, curving branches, produce something the same effect as the fruit of a species of *opulus* or cranberry-tree. . . . The common name which would naturally recall one of the hydrangeas, is in reference to a trick of the bark in peeling not nine but many times into dilapidated-looking strips." The hydrangea (q.v.) referred to is *H. radiata*, a showy wild shrub, which is given this name by the mountaineers of the Southern States on account of the ragged peeling of its bark. Both shrubs flourish in rocky and swampy places, and both are susceptible of cultivation. Consult Lounsberry, 'Southern Wildflowers and Trees' (1901).

**Nine-Pins,** a game with nine pins or bottle-shaped pieces of wood set on end, at which a large wooden ball is rolled for throwing them down. See **BOWLS**; **BOWLING**.

**Nine Worthies,** romantic heroes grouped together in Arthurian legend, especially in the 'Triumphes des neuf Preux,' where the author describes a vision in which he saw three Jews (Joshua, David, Judas Maccabæus), three pagans (Hector, Alexander the Great, Julius Cæsar), and three Christians (Arthur, Charlemagne, Godfrey of Bouillon). These worthies, with occasionally a tenth, Bertrand du Guesclin, and with Guy of Warwick sometimes substituted for Godfrey of Bouillon, may be traced back to old Welsh legends; Brunet says the three triads are of Spanish origin; and Dunlop showed that the list appeared in an old Low German poem on Alexander. Shakespeare makes them the butt of some fooling in 'Love's Labour's Lost.'

**Ninekiller.** See **BUTCHER-BIRD**.

**Ninety-six, Fort,** a former Revolutionary fort in Abbeville County, S. C., near the Saluda River. It was so-called on account of being 96 miles from the frontier fort of Prince George.

**Ninety-three** ('Quatre-Vingt-Treize'), a novel by Victor Hugo, published in 1874. It bears the sub-title: 'Premier Recit. La Guerre Civile,' and was intended to form the first part of a trilogy. The edition of 1882 contains several remarkable designs signed by the author. The story deals with an episode of the Vendean and Breton insurrection.

**Nineveh,** nîn'ê-vê, the ancient capital of the Assyrian empire. The site of the city, which was destroyed about 606 B.C. by the Babylonian Nabopolassar and the Mede Cyaxares, has been identified with the modern Kouyunjik. It stands on the left bank of the Tigris, opposite to the town of Mosul. The first historic notice of Nineveh is in Genesis x.; it is described as "a great city" in the time of the prophet Jonah (about 865 B.C.). Ezekiel at the beginning of the 5th century B.C. speaks of its desolation in the most vivid imagery. "The Assyrian was a cedar in Lebanon, with fair branches"; "All the trees of Eden that were in the garden of God envied him"; but "strangers, the terrible of the nations, have cut him off"; "upon the mountains and in all the valleys his branches are fallen and his boughs are broken by all the rivers of the land; and all the people of the earth are gone down from his shadow and have left him." It was known to travelers that vast mounds covered the banks of the Tigris opposite Mosul and extended to a considerable distance inland. They were long considered to cover the ancient site of the Assyrian capital, but it was not until 1841 that M. Botta, the French consul at Mosul, began excavations with the result that he obtained a few fragments of brick and alabaster. He renewed his efforts at Khorsabad, 12 miles to the northeast, in 1843 and discovered an Assyrian edifice which had remained buried in the sand for thousands of years. The work was continued by Layard, who explored the lofty mounds of Nimrûd, situated 18 miles south-southeast of Mosul at the point where the tributary Zab joins the Tigris. This was the beginning of a series of the most remarkable discoveries. He immediately came upon numerous slabs covered with cuneiform inscriptions of

unique importance. A chamber in the ancient ruins was lined with these; they were in excellent preservation. He unearthed, moreover, gigantic figures of various kinds—winged bulls and lions with human heads and winged sphinxes, which stood as guardians at the gates of stately palaces. It was evident that the old city had been destroyed by fire, for the stone images in many cases were calcined and crumbled into dust on exposure to the air. The fire had not, however, desolated what the explorer designated the northwest palace. Here he discovered in excellent preservation 28 rooms, decorated with bas-reliefs, carvings, and moldings which told the tale of the art and civilization which had flourished at Nineveh in its palmy days. Returning to Kouyunjik Layard met with even more important results from his excavations. When he pierced the mounds at this point he was enabled to explore nine vast rooms, one of them 130 feet long, and all replete with interesting and valuable sculptures, inscriptions, and carvings. In 1849, after returning to England and arousing the interest of the learned world in his magnificent discoveries, he renewed his work at Kouyunjik and found an almost inexhaustible treasury of antiquities in the sand mounds of the plain. He was now acting as agent for the British Museum, whose Assyrian collection he enriched with some of its most precious examples of art and inscriptions. Loftus and Hormuzd Rassam continued the work in 1853 and the excavations at Nimrud were renewed by George Smith in 1873. There can be no doubt that some of these monuments represent the remains of ancient Nineveh, and scholars have arrived at the conclusion that the city of Ninus occupied the site of Kouyunjik and Nebbi Yunus on the left bank of the Tigris at the confluence of the Zab. Asur, an even earlier capital of Assyria, was undoubtedly built on the site of the modern Kalah Sherghat. The palaces of Sennacherib and Assurbanipal have been unearthed from the mounds of Kouyunjik, and a second palace of Sennacherib and Esarhaddon from the mounds of Nebbi Yunus. It is concluded from these discoveries that Nineveh proper was one of a cluster of cities and royal residences that stood on the banks of the Tigris. This city was square in shape, and each of the four walls was a mile in length. The palace of Sargon at the northern angle had a façade 400 yards in width. The chief sculptures and inscriptions which are now stored in the British Museum belong to palaces and temples in the northwest of the city. The principal palace was built in the 9th century B.C. by Assurnasirpal. Near by he built a great tower, rising with narrowing stages. His son Shalmaneser II. built the central palace of the group. The statue of Nebo in the British Museum was brought from what has been called the southeast palace, but was really a temple.

Nineveh was not the earliest capital of Assyria and only came into importance in the time of Sennacherib, who is recorded on the inscribed bricks to have built its walls. From his time it was the chief seat of empire, and gave its name to the whole group of cities between the Tigris and the Zab. Hence Jonah describes this Nineveh as a city of three days' journey, and Diodorus declares its circuit was 480 stadia.

Consult the works of Layard, Botta, and

Flandin; also Oppert, 'Expédition en Mésopotamie'; Smith, 'Assyrian Discoveries.'

**Nineveh, Va., Cavalry Engagement at.** After the battle of Cedar Creek (q.v.) in Virginia, Gen. Sheridan on 9 Nov. 1864 withdrew his army to Kernstown, and Gen. Early followed him as far as Middletown. Sheridan ordered Torbert, commanding his cavalry, to move on Early at noon of the 12th, Merritt's and Custer's divisions to the right, on the Back and Middle roads, against Rosser, and Powell's division to the left, on the Front Royal road, against Lomax. Powell moved down the road as directed, and thence across toward Middletown, and at Nineveh met McCausland's cavalry brigade, which charged him; but he made a counter-charge and routed it, capturing two guns, three wagons, two battle-flags, and 161 prisoners, and pursuing eight or nine miles up the Luray Valley. Six regiments were engaged on either side. The Union loss was 2 killed and 15 wounded; the Confederates lost 20 killed and 35 wounded. Meanwhile the column on the right drove Rosser across Cedar Creek, and under cover of the night Early again retreated up the valley to New Market. Consult: 'Official Records,' Vol. XLIII.; Pond, 'The Shenandoah Valley in 1864.'

E. A. CARMAN.

**Ningpo, nǐng'pó', China,** a city and treaty-port in the province of Che-Kiang, in a fertile plain on the left bank of the Takia or Ningpo River, 16 miles from its mouth, and about 100 miles south of Shanghai. It was opened to foreign trade by the Treaty of Nankin in 1842. It is surrounded by walls 5 miles in circuit, 25 feet high, and 15 feet wide at top, and, besides, has extensive suburbs outside. Though highly extolled by the Chinese as one of the most beautiful cities of the Celestial Empire, it consists of narrow filthy streets and one-storied houses, sometimes of stone, but mostly of brick. Its most remarkable edifice is a brick tower, formed of seven stories, and above 160 feet high, but now a mere ruin, and it contains numerous temples, colleges, etc., chief among them the temple of the Queen of Heaven, founded in the 12th century, but the present building, elaborately and richly ornamented, dates from 1680. Shops and immense storehouses occupy the quarters near the river, while eating-houses and tea shops abound near the gates and in the suburbs. A medical hospital, opened by a missionary society in 1843, has been found very beneficial. The manufactures consist chiefly of silk and cotton goods, carpets, furniture, etc. The native trade is very extensive. The principal exports are tea, silk, and raw cotton; and the principal imports, besides manufactured goods, sugar and opium. The average value of the trade of Ningpo for 10 years past has been about \$11,400,000. The great bulk of the trade is carried on with the other treaty ports. Ningpo was taken by the British without resistance in 1841. Pop. estimated at 260,000.

**Ninian, nín-ī-an, Saint,** the apostle of the southern Picts. He labored in evangelizing northern England and southern Scotland at the end of the 4th and the beginning of the 5th centuries. He was a Briton by birth, but had been thoroughly educated in language and philosophy at Rome. The field of his activity extended as far north as

the Grampian Hills, and his see was Candida Casa, Whithorn, the modern Wigtonshire, the southwestern county of Scotland. His death is placed by hagiologists in 432 and his festival is 16 September. The only church building which he is recorded to have founded is dedicated to St. Martin of Tours.

**Nin'igret**, an American Indian sachem of the Niantics, one of the Algonquin tribes. In 1637 he assisted the colonists in the Pequot war. In 1667 he sold much of his land on Long Island to the colonists. He died in 1677.

**Niño, Pedro Alonso**, pá'drō ā-lōn'sō nē'nō, Spanish navigator: b. Moguer, Spain, about 1455; d. about 1505. He accompanied Columbus on his third voyage in 1498 to Trinidad and the coast of Paria, and returned to Spain filled with the project of making an expedition to the new country in search of treasure. He was granted the royal permission, one fifth of the spoils to be the share of the Crown. The voyage was a successful one; he peaceably obtained from the Indians a great store of treasure, but was accused of withholding the share belonging to the king and died before the suit was ended.

**Ninon de l'Enclos**, nē-nōh dē lōn-klō, or **Lenclos**. See **LENCLOS, ANNE**.

**Ninus**, nī'nūs, eponymous king of Nineveh and founder of that city. His name is nowhere mentioned, apparently, in Assyrian monuments, and the story that he extended the Assyrian empire to India and to Egypt is historically false. But he figures largely in Greek myth and "history," where Nineveh is said to have been founded by him and named for him; he married Semiramis, wife of Onnes, but his wife murdered him, and ruled as regent for her son Ninias, who is as mythical a personage as his father. For Semiramis alone in these stories does history show any actual existence.

**Niobe**, nī'ō-bē, in Greek mythology, the daughter of Tantalus, was the wife of Amphion, who, in common with Zethus, governed Thebes, which they had built. According to the common accounts she had seven sons and seven daughters, and, proud of her blooming offspring, she so far forgot herself as to exalt herself above Latona, the mother of only two children — Apollo and Artemis; and in punishment of her presumption she had to witness the destruction of her children by the arrows of the twin deities. Anguish and despair transformed the wretched mother, after long wanderings, into a stone. Amphion and Zethus also fell, pierced by the arrows of Apollo, when, full of wrath, they penetrated into the sanctuary of the god. This is the most common account of the fate of Niobe, in the circumstances of which poets frequently differ, who have taken this story for a subject as often as artists. The origin of the fable seems to lie in the ancient figure of speech by which it was said of young people who died suddenly that they had been struck with the arrows of Apollo or Artemis; and in almost all languages, petrification is the natural image of the highest degree of torpid despair.

**Niobe of Nations, The**, a name applied to Rome, the "lone mother of dead empires."

**Niobium**, in chemistry, a metallic element discovered in 1801 by Hatchett, but more fully investigated by Rose, who named it. Niobium

is present in columbite, euxenite, pyrochlore, and in other minerals. The metal may be prepared from the fluoride of niobium by heating it in a covered crucible with sodium, and dissolving out the soluble salts with water. It is insoluble in nitric acid, difficultly soluble in hydrochloric acid, but dissolves in hot hydrofluoric acid. It forms two oxides of a chlorous character, uniting with basylous oxides to form salts.

**Niobrara**, nī-ō-brā'ra, a river which has its rise in Laramie County, Wyo.; and which flows east into Nebraska, crosses the northern part of the State, making regular, long north and south curves, and flows into the Missouri River at Niobrara in Knox County. It is about 460 miles long, flows rapidly in the upper part of its course, but moves slowly through the almost level prairie country of the northern part of Nebraska.

**Niobrara Stage**, in geology, a subdivision of the upper Cretaceous division, forming with the Benton stage the Colorado Epoch. It occurs in Kansas and South Dakota as well as in Colorado and further West, has a maximum thickness of 2,000 feet, and includes chalk, calcareous marls, shales, sandstones, and lime-stones.

**Nī'pa**, an East Indian palm (*Nipa fruticans*) of the order *Palmae* and the only species of its genus. It is a low-growing tree with creeping, smooth stems, and large clusters of fruit. Its abundant sap is used for sugar- and wine-making and its feathery leaves for thatching or roofing. These leaves are often 20 feet long and form the principal material for house-building in the farms and villages of the Philippines and East Indies generally. It abounds in the salt marshes, and like the mangrove (q.v.) with which it is commonly associated, it is an important land-builder.

**Nīpal**, nē-pāl'. See **NEPAL**.

**Nīph'er, Francis Eugene**, American physicist and electrical engineer: b. Port Byron, N. Y., 10 Dec. 1847. He was graduated from the Iowa State University in 1870, and became instructor there. He afterward went to Washington University as professor of physics and electrical engineering. In 1877 he organized the weather service of Missouri and in 1878 the Magnetic Survey. In 1889 he showed that positive photographic pictures could be developed in the full glare of sunlight instead of in a dark-room; and he also made the discovery that a photographic plate over-exposed could be developed as a positive and that a zero point exists between the negative and the positive which cannot be developed at all. He wrote: 'Theory of Magnetic Measurements' (1886); 'Electricity and Magnetism' (1895); 'Introduction to Geographical Algebra' (1898). He has also contributed scientific articles to the 'Transactions' of the St. Louis Academy of Science, of which he is a member.

**Nīphon**, nīf-ōn', **Nippon**, **Nipon**, or **Nihon**, the various Japanese pronunciations of Jih-pen (whence Japan), signifying sun-origin, the Chinese name for the island empire, and locally adopted by Japan in the 7th century. Nippon was long used by foreigners to designate the principal island Hondo. See **JAPAN**.

**Nīp'igon**, a lake in Canada. See **NEPIGON**.

**Nipissing**, *nip-t-sing*, or **Nepissing Lake**, in Ontario, Canada, lies at an altitude of 600 feet above sea-level, northeast of Georgian Bay, Lake Huron, with which it communicates by French River. It is irregular in coast-line, is 48 miles long, and has a maximum breadth of about 30 miles. Its chief feeder is Sturgeon River, draining from the north a group of smaller lakes. The lake contains numerous islands, one of which is an Indian reservation. The Canadian Pacific railroad skirts the northern shore, and has stations at North Bay, and Nipissing Junction, on the lake shore. Steamers ply on the lake and the region has become a favorite sporting and hunting ground.

**Nipissing Indians**, an American tribe of the Algonquin family residing on the shores of Lake Nipissing, in northern Ontario, Canada. In the 17th century they were one of the most important tribes of British America and were regarded by the Jesuit missionaries as the typical Algonquins. A few survivors remain in the vicinity of Montreal.

**Nip'muc Indians**, or "fresh water people," an American tribe residing in colonial days in Massachusetts. The majority of the Nipmucs did not at first join with Philip in his war against the colonists, but were active against the English during the struggle in Connecticut in 1675. In January 1676 the remnant of Philip's tribe, with the Narragansetts, the Quaboag, and River Indians, effected a junction with the Nipmucs. On the overthrow of Philip the Nipmucs fled to Canada.

**Nipper**, Susan, in Dickens' 'Dombey and Son,' a young maid, nurse to Florence Dombey. She marries Toots. The sharpness of tongue whereby she justifies her name is offset by fidelity to her charge.

**Nipperdey**, *nip-për-dî*, Karl Ludwig, German philologist; b. Schwerin, Germany, 13 Sept. 1821; d. Jena, Germany, 2 Jan. 1875. He was educated at the universities of Berlin and Leipzig and in 1852 accepted a professorship at Jena. He made translations of Cæsar, Nepos, Tacitus, etc., with critical notes, which have been widely used. See Schöll's biography (1875), and his collection of his works, 'C. Nipperdeii Opuscula' (1877).

**Nippur**, *nip-poor'*, Asiatic Turkey, an ancient city of Babylonia, between the Tigris and Euphrates, 120 miles southeast of Bagdad, its site now marked by the numerous mounds and excavated ruins at Nuffar. Nippur was a great and flourishing city 4000 B.C., and the tablets of its great library discovered since 1888 antedate Abraham's departure from Ur of the Chaldees for the Promised Land. Nippur is identified with the Calneh of Genesis x. 10, and was the most northerly and easterly of the four conspicuous centres of Babylonian civilization and religion, literature and science. It was the seat of the worship of Bel, or the sun, the angry En-Lil, or Lord of the Storm, the cause of all the weather troubles of mankind, and the original conception of a god of anger and a religion of fear.

Nippur was overthrown and its buildings ruined by the Elamite hordes under Kudur-Nankhundi, 2285 B.C., who destroyed nearly every city of Babylonia. Favored by the permission and protection of the Sultan and his administration,

the University of Pennsylvania has since 1888 excavated and laid bare many of its important ruins. The work was supervised first by Dr. John Punnett Peters, and latterly by Dr. J. H. Haynes and Professor H. V. Hilprecht. Considerable attention was paid to the excavation of the great temple of Bel, the foundation of which was laid between 6000 and 7000 years before Christ. An ancient government palace of immense proportions, where the kings lived, belonging to the fifth millennium before Christ, and one of the ancient gates and walls of the city, were uncovered. A government palace erected about 3000 B.C. was completely and systematically excavated, besides numerous other buildings of less importance. Most valuable inscriptions in stone belonging to the earliest rulers of Babylonia, by the help of which the early history of mankind in the valley between the Tigris and Euphrates will be reconstructed, were discovered. Antiquities in coins, jewelry in gold, silver, and bronze in great quantities; vases in enameled and plain pottery of all periods; seals and seal cylinders, such as the Babylonians used in connection with their business transactions; images of gods, playthings in terra-cotta, bas-reliefs, weights, utensils in bronze, iron, and silver, etc., were also found. These were a few of the important relics recovered, without mentioning the numerous facts ascertained and the many questions solved through study in the trenches, which have important bearing upon the religious ideas and customs of the daily life of the Babylonians. But chief of the important discoveries made during 1889-1900 were those in connection with the famous library of the sanctuary, which was found beneath 25 feet of accumulated debris, representing several millenniums of history. In the uppermost stratum of this mound the excavators found coffins which had been buried in the early centuries of our Christian era. A great many antiquities were also gathered which belonged to the Jews who continued to live at Nippur after the return of Ezra and Nehemiah. Prominent among them were terra-cotta bowls containing incantations and charms inscribed in Hebrew and Mandæan. At a depth of 25 feet were found a series of rooms, a number of which contained ledges or shelves built out from the wall, for the purpose of laying out the tablets in rows. The library seems to have been divided into two parts. There was a business section for keeping accounts, and the educational quarters, with a vast library of a literary character.

Nearly 20,000 tablets were recovered, illustrating practically every branch of literature known to the Babylonians. Among the inscriptions are hundreds of historical texts, dictionaries, or lists of Sumerian words with Semitic equivalents; lists of birds, animals, plants, and stones; lists of words for chairs, stools and other articles of furniture; hymns, astronomical and mythological inscriptions, tablets which refer to the service and functionaries of the temple—how many garments the god Bel wore, how many temples and shrines there were at Nippur besides those dedicated to Bel, and what the revenues of the temples were; tablets containing grammatical sentences written by students, arithmetical calculations, etc.

In appreciation of Professor Hilprecht's valuable services, the Sultan presented him with

among other important antiquities, the larger part of the find of the library, which is now deposited in the University of Pennsylvania, and is undergoing systematic decipherment.

Only a small portion of the mounds at Nippur has thus far been completely excavated. Considerable work yet remains to be done on the temple. Only one side of the ancient government palace has been cleared, and about one twentieth part of the library, but arrangements have been effected for a continuance of the work of excavation until completed. See ASSYRIA; BABYLONIA, and illustrations Vol. II. Consult: Hilprecht, 'Old Babylonian Inscriptions, Chiefly from Nippur' (1893-6) and 'Explorations in Bible Lands During the Nineteenth Century' (1903); Peters, 'Nippur, or Explorations and Adventures on the Euphrates' (1897).

**Nirukta**, nī-rook'tā. See VEDA.

**Nirvana**, nīr-vā'na, a term which originally denotes the blowing out or extinction of a flame, and is used in the metaphorical language of Buddhist philosophy to mean that condition which succeeds to the long process of metempsychosis to which imperfect souls are subjected before they reach the end of Karma, the active life of earthly effort and struggle after perfection. Nirvana, according to Rhys Davids, was originally intended by Buddha to indicate extinction of existence, annihilation, as an escape from the perturbations of passion, and the miseries of life. The utterly negative character of this conception seems later on to have undergone a change. Buddha has said "it is enough to know that Nirvana is an advance beyond life; it is a condition of fearless security and happiness." But there is no definite implication that this happiness is conscious, or that a sense of personal identity accompanies it. Annihilation may be quite consistent with "Freedom from the pang of earthly existence" and even prove "a region or condition of peace." This peace in Nirvana results from the fact that no transmigration into baser forms of wretched ghost, beast, or demon is possible for the enfranchised spirit. The "extinction" in this case will only mean the extinction of the baser elements in the individual. The great and pure elements are developed in inverse ratio: there follows a calm and sinless state of mind, such as even Lucretius sometimes caught sight of when he speaks of "vita dis digna" as the object of the philosopher. "The life worthy of Gods,"—holiness, purity, freedom, wisdom, this is nirvana in the true Buddhist sense; though, when and where it is to be realized is left one of the misty problems of oriental mysticism. Consult: Müller, 'Die Bedeutung von Nirvana'; Rhys Davids, 'History and Literature of Buddhism'; Oby, 'Du Nirvana Boudhique'; Johnson, 'Oriental Religions: India.' See BUDDHA; BRAHMANISM; HINDUISM; JAINA.

**Nisami**, nī-sā-mē'. See NIZAMI.

**Nisan**, nī'sān, in the Jewish calendar, the first month of the sacred year and seventh of the civil year, answering nearly to our March. See CALENDAR.

**Nisard, Jean Marie Napoléon Désiré**, zhōn mā-rē nā-pō-lā-ōn dā-zē-rā nē-zār, French author: b. Châtillon-sur-Seine 20 March 1806; d. San Remo, Italy, 25 March 1888. He became professor of eloquence at the Collège de

France, Paris, in 1843; in 1857 director of the Ecole Normale Supérieure, and in 1867 a senator. In 1850 he was elected to the Academy. His reputation as a historian of literature was established by his 'Etudes de Mœurs et de Critique sur les Poètes latins de la Décadence' (1834). Others of his works are: An excellent 'Histoire de la Littérature française' (1844-9); 'Mélanges d'Histoire et de Littérature' (1859); the distinguished study, 'Les quatre grands Historiens latins' (1847); and 'Nouveaux Mélanges' (1886).

**Nisbet, nīz'bēt, Hume**, Scottish artist and novelist: b. Stirling, Scotland, 8 Aug. 1849. Leaving Scotland at 16 he spent six years in Australian travel and on his return was for eight years prior to 1885 art master in Watt College, Edinburgh. He has since twice revisited Australia and has published 45 romances, including 'Bail Up'; several volumes of verse, and various works on art, such as 'Where Art Begins,' and also of travel, such as 'A Colonial Tramp.'

**Nisbet, John**, Scottish forester: b. Edinburgh 2 Oct. 1853. He was educated at Edinburgh University, where he is now examiner in forestry, and also studied at Munich. Entering the Indian forest service in 1875 he became conservator of forests, Burma, in 1895, retiring in 1900. He has published 'British Forest Trees' (1893); 'Studies in Forestry' (1894); 'Our Forests and Woodlands' (1900); 'The Management of Forests in Theory and Practice' (1901); 'Burma under British Rule, and Before' (1901).

**Nisbet, Robert Buchan**, Scottish painter: b. Edinburgh 1 July 1857. He was educated at the Edinburgh Institution and chose as his profession that of landscape painter in water colors. His success was attested by the awards made to him at three international exhibitions—Dresden (diploma) 1892; Antwerp (medal) 1894; Vienna (medal) 1898. Among his most notable works are: 'Evening Stillness' (purchased by the Chantrey Bequest) 1890; 'Thunder Weather'; 'Harrowing'; 'Waiting for the Tide' (1898); 'Between Showers' (1898).

**Nish, nēsh, or Nissa, nēs'sa**, Servia, a fortified city on the Nishava, a tributary of the Morava, 130 miles southeast of Belgrade. It has Turkish and Servian sections, but as an increasing commercial and railway centre is rapidly becoming modernized. It was the seat of the National Assembly until 1901, and is the see of a Greek bishop. It has hot springs and baths, celebrated since the Roman era, when Nish is mentioned as Naissus by Ptolemy. Constantine the Great was born at Nish. Situated at the junction of many of the main highways of the Balkan Peninsula it has had a turbulent history, in 1456 being captured by the Turks; in 1878 it was taken by the Servians under King Milan. The unsuccessful attack in 1809 is still perpetuated by the "Tytele-Koula" (Tower of Skulls), erected by the Turks half a mile east of Nish, and consisting of the heads of Servians killed during the battle.

**Nishan el-Aaman, nī-shān' ēl ā-mān'** (Ar. *Nishan al-aman*, order of the best), Tunisian order of honor founded by Mohammed-es-Sadok in 1859. It commemorates the adoption of the constitution and has but one degree.

**Nishan el-Iftikhar**, ʔl-ʔf-tʔ-kār', a Tunisian order of merit, the data concerning which is not complete, but of which several medals were distributed by the bey on his visit to France in 1846. The degree seems to be indicated by the pecuniary value of the medal.

**Nishan el-Iftikhar**, Turkish order founded by Sultan Selim III. and revived in 1827. It is conferred upon foreigners who have rendered services to the Turkish state. There are no classes of honor, but the value of the medal differs with the degree of the recipient.

**Nishan i-Imtia**, ʔm-tʔ-ʔs', Turkish order of merit founded in 1879 by Sultan Abdul Hamid. It is conferred upon Turkish officials who have displayed at least three of the attributes: patriotism, fidelity, bravery, and zeal, these names being engraved on the medal.

**Nishan i-Shefkia**, ʔ-shʔf-kāt' (Ar.-Pers. *Nishān-i-shifqat*, order of clemency), Turkish order of three degrees established by Sultan Abdul Hamid in 1878. The medal is conferred upon women who have rendered aid to their country in times of war or peril.

**Nishapur**, nʔsh-ʔ-poor', Persia, the capital of a province of Khorasan, situated in a fertile plain at an altitude of 3,900 feet, 50 miles west of Meshed. Anciently it was of great commercial and political importance. An active domestic trade is still carried on, and the city has long been celebrated for the quality of the turquoises found in the district. Omar Khayyam was born here in 1123, and his unpretentious tomb is shown in a mosque among the ruins of the old town. Pop. (est.) 15,000.

**Nish'gar**. See NASS INDIANS.

**Nisibis**, nʔs'ʔ-bʔs, Asia Minor, anciently an important town, the capital of Mygdonia, Mesopotamia, now the town of Nisibin, in the vilayet of Diarbekir (pop. 10,000). The cuneiform inscriptions found here refer to it as Nasibina. It was frequently taken and retaken in the wars between the Romans and the Parthians, and afterward between the Romans and Persians, until it was given up to the latter by the Emperor Jovian in 363. The Persians were defeated here by Belisarius in 541, and by Marcian in 573.

**Nisqualli** (nʔz'kwā-lē) Indians, an American tribe of the Salishan family formerly residing on Puget Sound, Washington. They joined the Puyallup and other tribes in signing the Medicine Creek Treaty of 1854. In 1858, the Nisquallis took part in the general Indian war in the Northwest. There are to-day less than 100 survivors of the tribe.

**Nisroch**, nʔs'rōk, in Assyrian mythology, a god, in whose temple, and in the very act of idolatry, Sennacherib was slain by his own sons (2 Kings xix. 37). The name signifies "the great eagle"; and the earlier Assyrian sculptures exhumed at Nineveh have many representations of an idol in human form, but with the head of an eagle. Among the ancient Arabs, also, the eagle occurs as an idol. Historians have, however, long accepted Joseph Halévy's conjecture that the word is a corruption of Nusku; while it has also been held to be identical with Marduk of the later Babylonian pantheon.

**Nissa**, nʔs'sa, Servia. See NISSE.

**Nissen**, Heinrich, hʔn'rʔh nʔs'sʔn, German archaeologist: b. Habersleben, Germany, 3 April 1839. He was educated in Kiel and Berlin, and in 1869-76 was professor in Marburg and subsequently held professorships in Göttingen, Strasburg, and Bonn. He wrote: 'Kritische Untersuchungen über die Quellen der 4. und 5. Decade des Livius' (1863); 'Italische Landeskunde' (1883); 'Griechische und Römische Metrologie' (1887); etc.

**Nisus**, nʔs'ʔs, Greek mythological king of Megara. His life depended upon a lock of gold or purple hair and of this his daughter Scylla deprived him when Minos, her lover, laid siege to Megara. This act of treachery enabled Minos to take the city, but shocked by the conduct of Scylla, he had her tied to the stern of his ship and by some accounts she was drowned in the Saronic Gulf. Another legend makes her swim after Minos' ship and she is then pounced upon by her father in the form of a sea-eagle, whereupon she changes into the sea-bird Ciris, and is ever after pursued by him.

**Nithard**, nʔ-tār', Frankish historian: b. about 795 A.D.; d. near Angoulême 15 May 843. He was a grandson of Charlemagne. He was in the service of Louis the Pious, and later of Charles the Bald, whose cause he espoused during the dissensions between the sons of Louis. He fought in the battle of Fontenay, and was killed in a battle against the Northmen. At the command of Charles the Bald, he wrote a history of the times 'De dissensionibus filiorum Ludovici Pii ad annum usque 843,' which though naturally partisan, is a valuable source for the study of early mediæval history. It is contained in the 'Monumenta Germaniæ Historica,' published by Pertz (1870); and was also published by Holder (1882), and in German by Jasmund (1889).

**Nithsdale**, nʔths'dāl, William Maxwell, 5th EARL OF, Scottish Jacobite: b. Scotland 1676; d. Rome, Italy, 20 March 1744. He joined the Jacobites in 1715 and served under Forster and Derwentwater at Preston where he was captured. He was imprisoned in the Tower and sentenced to death, but assisted by his wife he made his escape in woman's clothing the night preceding the day set for his execution, though had they known it he had been reprieved. They then went to Rome where Nithsdale joined the followers of the Pretender. He was the "Willie" of 'Kenmure's up and awa'; and the story of his escape written by his countess will be found in 'Transactions of the Societies of Antiquaries of Scotland,' Vol. I.

**Nitocris**, nʔ-tō'krʔs, Egyptian queen, the last of the Sixth Dynasty. She succeeded her brother Menthuophis, whose assassination she avenged by drowning all who had any complicity in it. She was buried in the third in size of the greater pyramids, which she had enlarged. She was supposed by the Greek historians to be Rhodopis, "rosy-cheeked," a Greek courtesan, with whom the king fell in love from the sight of her lost slipper.

**Nitrate of Silver**, a compound of silver and nitric acid, having the formula AgNO<sub>3</sub>. It may be prepared by dissolving pure silver in warm nitric acid that has been diluted with two or three times its own weight of water. The solution is evaporated to dryness, and the resi-



Be gently heated until all the nitric acid has been expelled, after which it is dissolved in water and crystallized; the silver nitrate being then obtained in the form of white tabular crystals belonging to the trimetric system. Nitrate of silver is readily soluble in water and in alcohol. It melts at  $424^{\circ}$  F., and when cast into sticks it constitutes lunar caustic, being used in this form as a cauterizing agent. Its cauterizing effect depends upon the fact that it forms, with the albumen of the flesh, an insoluble albuminate of silver. Nitrate of silver, especially in the presence of organic matter, is blackened by exposure to light, and on account of this property it is used in the preparation of indelible inks for marking linen, and as a basis for dyes to color the hair black. It was much used in photography in the days of the old "wet-plate" process, and is still employed in sensitizing the paper upon which the positive pictures are printed. The black stains that it leaves upon the hands may often be removed by the application of cyanide of potassium; but it should be remembered that cyanide of potassium is a violent poison, and that it must be used with extreme care.

**Medical Uses.**—Nitrate of silver is officinal in two forms, the heavy crystalline salt, readily soluble in its own weight of water, and the lunar caustic above mentioned. Applied to the skin, it produces a brownish-black stain due to the formation of oxide of silver. The crystals only are used internally either in pills or solutions. Nitrate of silver as ordinarily applied to an inflamed mucous membrane is more of an astringent than of an irritant. Applied locally as a caustic, its action is superficial, coagulating the albumen and so forming a protective coating. Internally it is used (combined with an anodyne) in gastric ulcer, gastritis, intestinal ulcerations and dysentery. Salt and soap checks its action. Externally in stick form, it has been used to prevent the pitting of smallpox. In solution it is employed to quiet the pain and relieve swelling in cases of felon, orchitis, and epididymitis; in inflammation of the mouth, pharynx, and larynx; in whooping cough, pruritus ani, bed-sores, boils, granular lids, conjunctivitis, etc. Nitrate of silver should not be used internally for too long a time, as it is slowly eliminated from the body. Argyria or chronic poisoning is liable to result from such use of the remedy. See SILVER-POISONING.

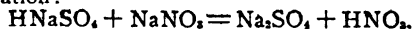
**Nitrate of Soda, Sodium Nitrate, or Chile Saltpetre**, a compound of sodium and nitric acid, having the formula  $\text{NaNO}_3$ . It may be prepared by neutralizing nitric acid with sodium hydrate or sodium carbonate, and evaporating the solution; but it occurs native and in large quantities, in the northern part of Chile, and in the neighboring parts of Peru and Bolivia. Deposits of it are also known in Humboldt County, Nev., and in San Bernardino County, Cal. The Chilean deposits occur at a height of 3,300 feet above the sea, but they are undoubtedly of marine origin, since they contain the remains of recent shells. Nitrate of soda, as it occurs in nature, may be purified by repeated crystallization from its aqueous solution. It crystallizes in rhombohedral forms, and is isomorphous with calcite; but in nature it is usually found massive, or in beds, or as an incrustation. The crude sub-

stance is valuable as a fertilizer (see MANURES AND MANURING), and it is also used extensively as a source of nitric acid and of nitre (qq.v.).

**Nitrates**, salts of nitric acid. See NITRATE OF SILVER; NITRATE OF SODA; NITRE; NITRIC ACID.

**Nitre, nî'ter, Niter**. **Nitrate of Potash, Potassium Nitrate, or Saltpetre**, a compound of nitric acid and potassium, having the formula  $\text{KNO}_3$ . It occurs native in many places as an incrustation upon the soil, notably in Spain, Egypt, Persia, and India. It also occurs in considerable quantities in the caverns of Kentucky and Tennessee, and elsewhere along the Mississippi Valley. It is obtained on a commercial scale from these various sources, but it is also prepared in vast amounts from native nitrate of soda (q.v.). When hot concentrated solutions of nitrate of soda and potassium chloride are mixed, nitrate of potash and chloride of sodium (common salt) are formed, the latter separating out in the form of crystals when the solution cools, while the nitrate of potash remains in solution. Nitre has mild antiseptic properties, and it is also used in dyeing, in metallurgy, in medicine (as a diuretic and diaphoretic), and in the preparation of fluxes. It is used in the arts most commonly, however, in the manufacture of gunpowder (q.v.). For "sweet spirits of nitre" see NITROUS ETHER.

**Nitric Acid** (Latin, "from nitre"), in chemistry, a compound of nitrogen, oxygen and hydrogen, having the formula  $\text{HNO}_3$ , and possessing strongly acid properties. It appears to have been discovered in the 9th century, by Geber, the "father of chemistry," who describes a method of preparing it by distilling a mixture of nitre, alum and copperas (sulphate of iron). The modern method of preparing it by the action of free sulphuric acid upon nitre was apparently first described by Glauber, about the middle of the 17th century. Lavoisier proved that the acid contains oxygen, and Cavendish, in 1785, succeeded in preparing nitre by passing electric sparks through a mixture of oxygen and nitrogen, in the presence of a solution of caustic potash. Free nitric acid occurs in rain-water in exceedingly small amounts, and its salts are formed, in the soil, by the bacterial oxidation of nitrogenous organic matter. (See NITRIFICATION.) Commercially, nitric acid is manufactured by distilling sodium nitrate ("Chile saltpetre") with strong sulphuric acid. The sulphuric acid ( $\text{H}_2\text{SO}_4$ ) unites with the sodium nitrate ( $\text{NaNO}_3$ ) to form nitric acid ( $\text{HNO}_3$ ) and acid sulphate of sodium ( $\text{HNaSO}_4$ ), as indicated by the equation:  $\text{NaNO}_3 + \text{H}_2\text{SO}_4 = \text{HNO}_3 + \text{HNaSO}_4$ . When the temperature is sufficiently raised, the acid sulphate of sodium combines with another molecule of the sodium nitrate to form normal sodium sulphate ( $\text{Na}_2\text{SO}_4$ ), another molecule of nitric acid being liberated at the same time, as indicated by the equation:



The temperature is not always carried to the point where this last reaction occurs, however, because although the yield is larger, the product is more largely contaminated with objectionable impurities, and the residual "cylinder cake," or "nitre cake," left in the retorts, is harder to remove. The distillation is commonly carried

out in iron retorts, iron not being seriously attacked by concentrated sulphuric or nitric acids. The nitric acid which distills off is washed by passing it through a series of double-necked iron bottles ("Woulfe's bottles"), containing, each, a small quantity of water. The distillate is finally condensed, then constituting the crude, fuming acid. Nitric acid, as thus manufactured, is yellowish in color, and contains, as its principal impurities, chlorine, hydrochloric acid, iodic acid, peroxid of nitrogen, sulphuric acid, sodium sulphate, and iron compounds; some of these being distilled over, and others carried over mechanically. Most of the impurities may be removed by re-distillation. A third distillation then follows, after the addition of an equal volume of concentrated sulphuric acid to retain the major part of the water. By this means a tolerably pure nitric acid can be had, though it is still yellowish from the presence of lower oxids of nitrogen. These may be removed by warming the acid slightly, and passing through it a stream of air, or (preferably) of carbon dioxid gas. Any nitrous acid that may be present may be removed by distillation with a small quantity of urea, which decomposes the nitrous acid with liberation of carbon dioxid, water, and free nitrogen.

Nitric acid, perfectly free from water, has not yet been prepared, although specimens have been obtained containing from 99.5 to 99.8 per cent of  $\text{HNO}_3$ . When free from all impurities except water, nitric acid is a colorless liquid, which gradually decomposes in a strong light, with evolution of oxygen, water, and nitrogen peroxid ( $\text{NO}_2$ ), becoming yellow from the presence of the peroxid. The most highly concentrated acid freezes at about  $50^\circ \text{F}$ . below zero, and boils at about  $187^\circ \text{F}$ ., although it begins, below the boiling temperature, to decompose into nitrogen peroxid, water, and free oxygen. Concentrated nitric acid may have a specific gravity as high as 1.552. Nitric acid was formerly known as "spirit of nitre," and (when diluted) also as "aqua fortis" (that is, "strong water"). It is an active oxidizing agent, especially when warmed, owing to the facility with which it parts with oxygen. When mixed with hydrochloric acid, it is known as "nitrohydrochloric acid," "nitromuriatic acid," or "aqua regia," the latter name being given on account of the power that the mixture has of dissolving gold. The powerful solvent action of nitrohydrochloric acid is due to the fact that it contains free chlorine gas, liberated from the hydrochloric acid by the oxidizing action of the nitric acid upon the hydrogen of the hydrochloric acid. Nitric acid and nitrohydrochloric acid are both used in medicine, in a highly dilute state, as appetizers and diuretics.

Nitric acid is used in large quantities in chemical industries of all kinds. It is of the greatest importance in the manufacture of the coal-tar colors, and of many of the modern high-power explosives. (See, for example, NITROGLYCERIN and GUNCOTTON.) With the metallic bases it forms a series of exceedingly important salts known as "nitrates." Practically all of the nitrates are crystalline and readily soluble, and they are characterized by marked decrepitation when heated upon charcoal before the blowpipe. Several of the nitrates are used in dyeing, notably those of aluminum, iron,

and lead. Aluminum nitrate,  $\text{Al}(\text{NO}_3)_3$ , may be prepared by dissolving aluminum hydrate in dilute nitric acid, and crystallizing by evaporation. It crystallizes in rhombic prisms which contain nine molecules of water, are readily soluble, and melt at  $99^\circ \text{F}$ . Ferrous nitrate,  $\text{Fe}(\text{NO}_3)_2 + 6\text{H}_2\text{O}$ , is prepared by dissolving ferrous sulphide in dilute nitric acid, and slowly evaporating the solution at as low a temperature as possible. Ferric nitrate,  $\text{Fe}(\text{NO}_3)_3 + 9\text{H}_2\text{O}$ , crystallizes in rhombic prisms, and may be prepared by dissolving metallic iron in nitric acid, adding more acid, and finally cooling the solution. It is readily soluble in water, but nearly insoluble in cold dilute nitric acid. Normal lead nitrate,  $\text{Pb}(\text{NO}_3)_2$ , may be obtained in the form of octahedral crystals, by evaporating a solution of lead carbonate in dilute nitric acid. The nitrates of barium and strontium are used to a large extent in pyrotechny, on account of the beautiful colors that they yield. They may be prepared by adding, to the corresponding carbonates, not quite enough dilute nitric acid to decompose the whole of the salt, and subsequently filtering and crystallizing. See also NITRATE OF SILVER; NITRATE OF SODA; NITRE.

A. D. RISTEEN.

Nitrides, in chemistry, compounds consisting of nitrogen and one other element. They are usually prepared by the action of ammonia upon metallic oxids or chlorides, but in some cases they may be prepared by the direct combination of free nitrogen with the other constituent. Nitride of boron ("æthogen"), for example, has the formula  $\text{BN}$ , and is formed when boron is heated in nitrogen gas. Magnesium nitride, a crystalline substance having the formula  $\text{Mg}_3\text{N}_2$ , is also formed when metallic magnesium is heated to redness in an atmosphere of nitrogen. Ramsay, Raleigh, Travers, and others, took advantage of this latter fact for effecting the absorption of the nitrogen of the air, in their researches upon argon, helium, and the other rare gaseous elements of the atmosphere. (See ARGON.) The nitrides of the metals are mostly decomposed by heat, and sometimes with explosive violence. Magnesium nitride, however, is quite stable.

Nitrification, the process by which nitrates are formed, either in the soil or elsewhere, by the putrefactive or fermentive decay of nitrogenous organic matter, or by the oxidation of nitrogen itself. It has long been known that nitrates are formed in the soil, and in India, as well as in Spain and certain other parts of Europe, nitrate of potassium ("nitre") is still manufactured to some extent by mixing porous soil with manure and other organic refuse, adding wood ashes (as a source of potassium), and allowing the mass to stand in heaps for two years or so. Under suitable conditions of temperature and moisture, the yield may be as much as ten pounds of crude nitre per ton of earth. Analogous changes go on, from year to year, in all fertile soil, and it was formerly believed that the natural conversion of nitrogenous matter into nitrates is due to the fact that the soil, by a sort of capillary action, condenses air within its pores; oxidation being thereby promoted because the air held by the soil, being denser than normal atmospheric air, contains more oxygen per unit of volume.

## NITRILE — NITRO-COMPOUNDS

In 1862, however, Pasteur suggested that nitrification is effected through the agency of bacteria, or other forms of microscopic life; and in 1877 Schlösing and Müntz established this view upon a firm foundation, by means of many ingenious experiments. It has also been further and most convincingly established by Warington, Munro, Winogradsky, P. F. Frankland, G. C. Frankland, and others. It has been shown, for example, that nitrification is arrested by powerful antiseptics, and that it proceeds most actively at about 100° F., and less rapidly both at higher and at lower temperatures. Furthermore, if soil or sewage be raised in temperature to 212° F., so as to destroy all life that may be present, nitrification at once stops, and it will not proceed again when the temperature is restored to 100° F., even in the presence of abundance of air that has been passed through germ-proof filters. If the sterilized mass be "sown" with the nitrifying agents, however, by the addition of a small quantity of unsterilized soil or sewage, nitrification is at once resumed, and thereafter proceeds normally. Certain conditions are essential to active nitrification, in addition to a suitable temperature, the free access of oxygen, and the actual presence of a sufficient number of the live and active organisms. It is essential, for example, that the soil or other medium in which the nitrification occurs shall be slightly alkaline, and this implies the presence of a base such as potash or carbonate of lime, in sufficient quantity to fix the nitric acid as it is formed; for if no such base is present, the medium soon becomes acid, so that the organisms cease their activities. It is usually held that some quantity of organic carbon must also be present, in order to furnish food for the nitrifying organisms; but it appears that this is not essential in all cases, because certain forms of life have been found to be capable of nitrifying inorganic solutions, obtaining their carbon from carbon dioxide gas. In the presence of a considerable amount of organic carbon, especially when the conditions are otherwise unfavorable to nitrification, an inverse process, known as "denitrification," is likely to result, such nitrates as happen to be present being thereby reduced to compounds that are less highly oxidized. Denitrification also appears to be due to the activities of special micro-organisms, and whether the nitrates of a soil increase or decrease depends upon which of the two antagonistic kinds of organism is most highly favored by the conditions. Moisture is essential in both cases; but its absolute amount is of the greatest importance. Nitrification may be proceeding rapidly in a soil that is moderately moist and well aerated, and yet the same soil, when thoroughly waterlogged, may be a vigorously denitrifying medium. Nitrification proceeds best in the dark, and strong light checks it in a marked manner, or even stops it altogether. In nature, nitrification is most active within a few inches of the surface of the ground, and it takes place only with exceeding slowness at a depth of two or three feet. Some micro-organisms transform nitrogenous compounds into compounds of ammonia, some transform ammoniacal salts into nitrites, and some transform nitrites into nitrates. In nature, it is probable that all these processes go on simultaneously. It was long believed that the free nitro-

gen of the air does not take part in the nitrification processes of the soil. It is now pretty generally admitted, however, that certain micro-organisms actually possess the power of absorbing free nitrogen, and fixing it in the form of a chemical compound. We do not yet know how general this power may be, but it appears to be exhibited, beyond dispute, by some of the microscopic forms of life that live, perhaps parasitically, upon the roots of the pea and certain similar plants.

Consult: Aikman, 'Manures and Manuring'; Conn, 'Agricultural Bacteriology'; Roberts, 'Fertility of the Land.'

**Nitrile**, in chemistry, a compound which may be regarded as derived from ammonia,  $\text{NH}_3$ , by replacing the three hydrogen atoms by a single trivalent organic radical. (Compare **AMIDE**.) They have the general formula  $\text{XCN}$ , where X represents methyl ( $\text{CH}_3$ ), ethyl ( $\text{C}_2\text{H}_5$ ), or some similar monovalent alcoholic radical, and they may therefore be regarded as alkyl cyanides. They may be prepared by distilling potassium-alkyl sulphates with potassium cyanide, the general reaction being  $\text{XKSO}_4 + \text{KCN} = \text{K}_2\text{SO}_4 + \text{XCN}$ . Acetonitrile, for example, which has the formula  $\text{CH}_3\text{CN}$ , may be prepared by distilling dry potassium-methyl sulphate,  $\text{CH}_3\text{KSO}_4$ , with dry potassium cyanide,  $\text{KCN}$ . Acetonitrile is also known as methyl cyanide, and is a colorless, inflammable liquid with an ethereal odor, mixing readily with water and with alcohol, having a specific gravity of 0.80, and boiling at about 178° F.

**Nitrite of Amyl**. See **AMYL NITRITE**.

**Nitrites**, salts of nitrous acid (q.v.).

**Nitro-benzene**, or **Nitro-benzol**, a liquid chemical substance having the formula  $\text{C}_6\text{H}_5\text{NO}_2$ , which is formed by the action of fuming nitric acid upon benzene. See **ANILINE** and **BENZENE**.

**Nitro-cellulose**, a compound of nitric acid with cellulose, in which the hydroxyl of the cellulose is more or less completely replaced by molecules of  $\text{NO}_2$ . An exchange of  $\text{NO}_2$  for  $\text{OH}$  always occurs when cellulose is treated with nitric acid, but the extent of the nitration depends upon the circumstances of the treatment. The nitro-celluloses are more properly described as "cellulose nitrates," and five of them are known. Of these, collodion pyroxyline and guncotton are the most important. Collodion pyroxyline is a mixture of the tetra-nitrate and tri-nitrate, and guncotton (which is sometimes described as the tri-nitrate) is really the hexa-nitrate, its chemical formula being  $\text{C}_{12}\text{H}_7\text{O}_{16}\text{N}_6$  ( $\text{NO}_2$ )<sub>6</sub>.

**Nitro-Compounds**, in chemistry, compounds in which one or more atoms of hydrogen are replaced by an equal number of nitroxyl ( $\text{NO}_2$ ) radicals, the nitroxyl radicals being directly connected with carbon by means of their nitrogen atoms. Many of the nitro-compounds are of great importance in the chemistry of coal-tar derivatives. Nitro-benzene,  $\text{C}_6\text{H}_5\text{NO}_2$ , for example, which is obtained by the action of nitric and sulphuric acids upon benzene, is the source from which commercial aniline is manufactured. See **ANILINE** and **BENZENE**. Consult, also: Benedikt, 'Chemistry of the Coal-Tar Colors.'

## NITRO-HYDROCHLORIC ACID — NITROGEN

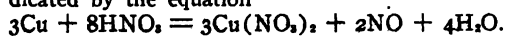
**Nitro-hydrochloric Acid, Nitro-muriatic Acid, or Aqua Regia**, a mixture of nitric and hydrochloric acids, formerly known as "aqua regia," or "royal water," on account of its power to dissolve gold. See **NITRIC ACID**.

**Nitrogen** (Greek, "producing nitre"), a gaseous, non-metallic element existing in nature in the free state, and also occurring, in chemical combination, in numerous minerals. It is an essential constituent of many of the animal and vegetable tissues, especially of the proteids, or albumen-like substances. It exists in the free state in the earth's atmosphere, of which it constitutes 77 per cent by weight, or about four fifths by bulk. Nitrogen is a colorless gas, without taste or odor, and it will neither burn nor support combustion. It is not poisonous (as is evident from its presence in the air), and when inhaled in the pure state it produces asphyxia only by excluding oxygen from the lungs. Nitrogen is slightly lighter than air, its density being approximately 0.97247, when that of air is taken as unity. According to Jolly, a cubic decimetre of nitrogen, under a pressure of 760 millimetres of mercury at the sea-level in lat. 45°, weighs 1.25746 grams. The specific heat of nitrogen at constant pressure, as compared with an equal weight of water, is 0.2368; and, according to Chappuis, if a given mass of the gas, at an initial temperature of 32° F. and a pressure of one metre of mercury, be heated at constant volume to 212° F., its pressure becomes equal to that due to 1.36745 metres of mercury. (This last-given constant was determined with the greatest care, as it is of the highest importance in modern precise thermometry by means of the nitrogen thermometer.) Nitrogen can be liquefied by the simultaneous application of great cold and great pressure. Sarrau gives its critical temperature and pressure as 191° F. below zero, and 42 atmospheres, respectively. Rutherford, in 1772, showed that the expired air of men and animals contains a gas which will not support combustion, and which is nevertheless different from carbon dioxide, since caustic potash will not absorb it. Shortly afterward Lavoisier proved that this gas exists in the free air, and since it will not support life he called it "azote" (Greek, "not supporting life"), a name by which it is still known in France, and some of whose derivatives also survive in English. ("Azo-benzene," for example.) The modern word "nitrogen" is due to Chaptal.

Chemically, nitrogen has the symbol N, and an atomic weight of 14.04 if  $O=16$ , or 13.93 if  $H=1$ . It may be prepared in a state of approximate purity from the atmosphere, by the following process: A slow stream of air is passed through tubes of moistened potassium hydrate to absorb carbon dioxide, then through tubes of calcium chloride to absorb moisture, then through a tube containing red-hot copper turnings to remove the oxygen, then through a solution of chromium chloride to remove the last traces of oxygen, then again through tubes of calcium chloride to remove moisture, and lastly over phosphorus pentoxide to complete the removal of moisture, and also to absorb any ammonia that might be present. The nitrogen so obtained will still contain argon, helium, neon, and the other recently discovered inert gases of the atmosphere, however; and if these

are objectionable, it is best to prepare the nitrogen from some of its compounds, from which argon and similar gases are necessarily absent, on account of their chemical inertness. Ammonium nitrite,  $NH_4NO_2$ , is a convenient substance for this purpose, because it is resolved, by heating, into water and free nitrogen, as indicated by the equation  $NH_4NO_2 = 2H_2O + 2N$ .

Free nitrogen does not exhibit any marked chemical affinity, though it can be made to combine with other elements in various ways, and its compounds are often exceedingly active, as is familiarly illustrated by nitric acid and by ammonia. Five oxides of nitrogen are known. (1) *Nitrous Oxid*,  $N_2O$ , for which see the article **NITROUS OXID**. (2) *Nitrogen Dioxid*, or Nitric Oxid,  $NO$ , discovered by Priestley, who called it "saltpeter-gas." This is a colorless gas, prepared by acting upon metallic copper with cold dilute nitric acid,  $HNO_3$ ; copper nitrate, nitrogen dioxide and water being formed, as indicated by the equation



Nitrogen dioxide combines directly and readily with oxygen, the combination taking place promptly upon contact with common air, higher oxides of nitrogen being formed. The dioxide may be liquefied by the application of cold and pressure, but there is still much uncertainty about its critical point. The liquefied gas freezes at about 270° F. below zero. (3) *Nitrogen Trioxid*, or Nitrogen Sesquioxid,  $N_2O_3$ , may be prepared (though not in a strictly pure state) by the action of nitric acid upon starch, or upon arsenic trioxid. It is a reddish gas, which condenses to a volatile blue liquid upon being cooled by a freezing mixture to 0° F. Nitrogen trioxid also dissolves in ice-cold water with the formation of a blue liquid containing nitrous acid,  $HNO_2$ . (See **NITROUS ACID**.) (4) *Nitrogen Peroxid*,  $NO_2$ , formerly known as the "dioxid." This oxid may be prepared by heating dry nitrate of lead, which then breaks up into lead oxid, oxygen, and nitrogen peroxid, as indicated by the equation  $2Pb(NO_3)_2 = 2PbO + 4NO_2 + O_2$ . It is a dark orange-colored gas, which has the molecular formula  $N_2O_4$  at low temperatures, for which reason it is often called the "tetroxid." At 300° F. the gas has the molecular formula  $NO_2$ , as is proved by its density; and at ordinary temperatures it consists of a mixture of  $NO_2$  and  $N_2O_4$ . At about 370° F. a further dissociation into  $NO$  and  $O$  begins, this increasing as the temperature rises, until, at about 1,150° F., the dissociation into  $NO$  and  $O$  is complete. Nitrogen peroxid is easily liquefied and solidified. At temperatures lower than 14° F. it is a white, deliquescent, crystalline solid. At 16° F. this melts to a colorless liquid, which becomes yellow when warmed to 32° F., and orange at 70° F. Under ordinary atmospheric pressure it boils at about 72° F., with the evolution of the gaseous peroxid. (5) *Nitrogen Pentoxid*, or Nitric Anhydride,  $N_2O_5$ , may be prepared by dehydrating concentrated nitric acid by the cautious addition of phosphorus pentoxid, or by passing chlorine gas over dry silver nitrate. In the latter case the reaction is  $2AgNO_3 + 2Cl = 2AgCl + N_2O_5 + O$ . The pentoxid is solid at ordinary temperatures, and may be obtained in the form of white, lustrous, translucent prisms, which have a specific gravity of

## NITROGLYCERIN

about 1.64, and melt at 36° F. with partial decomposition into the peroxid and free oxygen. At about 115° F. the liquid obtained by melting the crystals boils. The pentoxid combines with water to form nitric acid (q.v.).

Nitrogen combines directly with certain of the other elements to form compounds known as nitrides (q.v.). With chlorine it forms an oily liquid known as chloride of nitrogen, which has the formula  $\text{NCl}_3$ , and may be prepared by passing chlorine gas through a solution of sal ammoniac. Chloride of nitrogen is one of the most dangerous explosives known, decomposing with fearful violence upon the slightest touch, and often with no assignable cause whatever. Several compounds of hydrogen with nitrogen are known, of which ammonia,  $\text{NH}_3$ , is the most familiar and also the most important.

See AMIDE; AMINE; AMMONIA; NITRIC ACID; NITRIFICATION; NITROUS ACID; NITROUS OXID; etc.

**Nitroglycerin**, or **Glonoin**, a powerful explosive discovered by Ascanio Sobrero in 1846, and first produced commercially by Emmanuel and Alfred B. Nobel, at Helenborg, Sweden, in 1862. The process of manufacture was much improved by George M. Mowbray of North Adams, Mass., and Walter N. Hill of the U. S. Torpedo Station, at Newport, R. I., these improvements yielding a product of greater purity, and also overcoming many of the dangers attending the manufacture, transportation and use of the substance. Nitroglycerin is manufactured by treating glycerin with a mixture of concentrated nitric and sulphuric acids, but the proportions of the material used and the methods of operation are different in different countries. In the United States the acids are usually mixed in the proportion of 2 parts by weight of nitric to 3 parts by weight of sulphuric, so as to contain 61.9 per cent of real  $\text{H}_2\text{SO}_4$ , 34.5 per cent of  $\text{HNO}_3$ , and not more than 0.7 per cent of  $\text{N}_2\text{O}_5$ . These "mixed acids" are shipped from the acid works in iron drums holding 1,500 pounds each, this weight being a convenient charge for one run in the nitroglycerin converter. The "converter" or "nitratator" is a closed cylindrical vessel of lead, standing within a wooden one. The mixed acids are introduced by a pipe at the top of the converter, and the glycerin is forced into the vessel at the bottom, by means of compressed air. The fumes produced by the reaction are carried off through a "fume pipe," which is provided with a window to view the gases. The reaction between the glycerin and the acids causes the evolution of considerable quantities of heat; and to prevent the temperature of the converter from rising to the danger point, cold water is continually passed through the space between the lead cylinder and the wooden one, and also through a cooling coil of lead pipe, which is placed within the lead cylinder. Compressed air is also injected directly into the mixture to aid in the cooling, and extra air pipes are provided, for use in case the rise of temperature cannot be controlled by the means that are normally sufficient. The temperature of the mixture is continuously observed, by means of sensitive, specially constructed thermometers, which enter the converter through the top. In operating the process, the mixed acids are run into the con-

verter first, the cooling water is next turned on, and, lastly, the glycerin is slowly introduced at the bottom. When the materials are pure, and no particle of water is allowed to enter the mixture, and the temperature is not permitted to rise above 86° F., this part of the operation may be regarded as reasonably safe.

When the conversion is completed, the charge of the converter is run off into a "separator," which is a cylindrical leaden vessel provided with windows, with a vent pipe for the escape of vapors, and with an injector pipe, through which compressed air may be introduced for cooling purposes, in case any tendency toward rise of temperature is observed. When the charge is allowed to stand, the nitroglycerin rises to the top of the separator, and the spent acids, by reason of their greater density, sink to the bottom. The separation being nearly complete, the nitroglycerin is drawn off through an upper spigot, and the spent acids are drawn off at the bottom and passed to a second separator, for the removal of the last traces of nitroglycerin that they contain. The nitroglycerin is now repeatedly washed with water, then with a solution of soda ash, and again with water, until the last traces of acid are removed from it. The spent acids are sent to the "regaining" works, where the sulphuric acid (which is not destroyed in the process) is recovered for further use. The small quantity of nitric acid that remains unused is also recovered in a dilute form, and used for other purposes. Theoretically, 100 parts by weight of glycerin should yield 246 parts of nitroglycerin; but the yield in the United States is only from 200 to 220 parts.

Nitroglycerin is also known as "glonoin," "Nobel's blasting oil," and "trinitroglycerin." It was originally supposed to be a nitro-substitution compound, like many other substances produced by the action of nitric acid upon organic compounds, and hence the name it now commonly bears. But Berthelot has shown that its reactions are those of a salt or ester of nitric acid, and its correct chemical name is now admitted to be "glyceryl trinitrate," or "propenyl trinitrate." "Glyceryl" or "propenyl" is the name of the organic radical  $\text{C}_3\text{H}_5$ , and ordinary glycerin,  $\text{C}_3\text{H}_5(\text{OH})_3$ , is the hydrate of this radical. Nitroglycerin has the formula  $\text{C}_3\text{H}_5(\text{NO}_2)_3$ , and is formed from nitric acid and glycerin in accordance with the equation  $\text{C}_3\text{H}_5(\text{OH})_3 + 3\text{HNO}_3 = \text{C}_3\text{H}_5(\text{NO}_2)_3 + 3\text{H}_2\text{O}$ .

When chemically pure, glyceryl trinitrate is a colorless, odorless, transparent, oily liquid, but commercial nitroglycerin varies in color between a hock-wine and a dirty yellow. It has a specific gravity of 1.599 when liquid, and 1.735 when frozen. It freezes at 46° F. if exposed for a long time to this temperature, forming long, whitish crystals, which melt again upon prolonged exposure to a temperature of 52° F. According to Hess it volatilizes completely upon continuous exposure to a temperature of 158° F., and Guttman has found that dynamite (see below) loses 10 per cent of its nitroglycerin by an exposure of several days to a temperature of 104° F. Nitroglycerin is almost insoluble in water, but dissolves readily in wood alcohol, grain alcohol, ether, benzene, and many other organic liquids. It undergoes dangerous decomposition with explosion upon contact with

## NITROUS ACID—NITROUS ETHER

sulphuric acid (except under the conditions of manufacture described above), and it is also decomposed by alkalis and by alkaline sulphides. The safest way to destroy it is by treating it with a solution of ammonium sulphide, or, where the quantity is large, with spent lime from the purifiers of gas works. Nitroglycerin has a sweetish, burning taste, and is poisonous, producing extremely violent headaches when taken by the mouth, absorbed through the skin, or inhaled as vapor; though some persons, by constant association with it, become immune to its physiological effects. The antidotes are cold compresses, fresh air, black coffee, and morphine. It is used in medicine as a heart stimulant, in the treatment of angina pectoris, in the revival of the drowned, and as an antidote in cases of poisoning by carbon monoxid and water gas.

The critical temperature of decomposition of nitroglycerin is between  $113^{\circ}$  F. and  $122^{\circ}$  F. At  $113^{\circ}$  F. it keeps indefinitely if free from acid, but between that temperature and  $122^{\circ}$  F. it begins to decompose, and at  $160^{\circ}$  F. decomposition goes on actively. Pure nitroglycerin is not very sensitive to friction or moderate percussion, except when pinched between metallic surfaces, or struck a glancing blow. If placed upon an anvil and struck with a hammer, only the particle struck, as a rule, explodes, the remainder being scattered; but this is an unsafe experiment to try with a quantity of the explosive, because in some cases the whole mass will be exploded. Frozen nitroglycerin is in general less sensitive to shock than the liquid, but explosions have occurred which were believed to be due to the breaking of a crystal of the solid substance. When a small quantity of nitroglycerin is freely exposed to a flame, it burns brilliantly and without explosion; but when the experiment is tried with a larger quantity, explosion is likely to follow. A drop of nitroglycerin, when placed upon an iron plate and slowly heated, may volatilize completely without exploding; and if the drop is placed on an iron plate that is previously heated to incandescence, it will assume the spheroidal condition and volatilize without explosion; but if the plate be heated to a temperature just below incandescence the drop explodes violently upon contact with it. Nitroglycerin was at first exploded, in blasting, by means of a gunpowder fuse, and this method is still used to a limited extent with dynamite; but it is chiefly fired by means of a powerful detonator, by which its greatest explosive efficiency is realized.

Nitroglycerin is principally used in the manufacture of dynamite, explosive gelatine, gelatine dynamites, and smokeless powders such as ballistite and cordite. The liquid substance is used in torpedoes for oil wells, to remove the paraffin which clogs them or to shake the oil-bearing sandstone so as to secure a better flow of oil. Owing to the difficulty and danger of transporting and handling liquid nitroglycerin, attempts were early made to absorb the liquid by means of some substance which would not interfere with its explosive action, but which would form with it a solid body, or a powder, which could be handled more conveniently and safely. Many such absorbents have been tried, charcoal being the first; but Nobel found that

a kind of infusorial earth, consisting chiefly of the silicious remains of diatoms, and known as "kieselguhr," is much superior to charcoal, and this substance is now largely used as an absorbent, in the manufacture of common "dynamite." Sawdust, especially in combination with certain chemical substances, is used as an absorbent to a considerable extent. "Dualin," for example, is a mixture of 50 parts of nitroglycerin, 30 of sawdust, and 20 of saltpeter, and "Atlas powder" and "Hercules powder" consist of nitroglycerin, carbonate of magnesia, wood fibre, and sodium nitrate. "Blasting gelatine," invented by Alfred Nobel, consists of nitroglycerin gelatinized by the addition of nitrated cotton fibre; its manufacture being based upon the fact that a mixture of mononitro-cellulose and dinitro-cellulose, when free from unnitrated cotton and from trinitro-cellulose ("gun-cotton"), dissolves in warm nitroglycerin with the formation of a gelatinous substance. "Gelatine dynamite" consists of a mixture of thin blasting gelatine with wood meal and saltpeter.

During 1900 the United States produced 35,482,947 pounds of nitroglycerin, of which 31,661,806 pounds were used in further manufactures.

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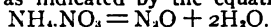
**Nitrous Acid**, an acid which has the formula  $\text{HNO}_2$ , but which is too unstable, in the free state, to admit of isolation. A blue, aqueous solution of it may be prepared by dissolving nitrogen trioxid in ice-cold water (see **NITROGEN**); but when this solution is warmed the nitrous acid decomposes into nitric acid, nitric oxid and water, as indicated by the equation  $3\text{HNO}_2 = \text{HNO}_3 + 2\text{NO} + \text{H}_2\text{O}$ . The salts of nitrous acid (which are known as "nitrites") are more stable, and certain of them occur in the soil as a result of the oxidation of organic matter. (See **NITRIFICATION**.) The nitrites of the metals are mostly soluble in water and in alcohol, their solutions being decomposed by boiling, or by the addition of dilute sulphuric acid. Potassium and sodium nitrites may be prepared by melting the corresponding nitrates with metallic iron, and crystallizing from solution in water. Silver nitrite,  $\text{AgNO}_2$ , may be prepared by heating starch with nitric acid, passing the resulting gas into a solution of caustic potash, neutralizing this with acetic acid, and finally adding a solution of silver nitrate. It crystallizes in small white crystals, is one of the most insoluble nitrites, and may be used in the preparation of many of the others. Ammonium nitrite,  $\text{NH}_4\text{NO}_2$ , for example, may be obtained by adding a solution of silver nitrite to one of ammonium chloride (sal ammoniac). Nitrite of ammonium is used as a source of nitrogen, since it is decomposed by the action of heat into water and free nitrogen. Many of the organic derivatives of nitrous acid are also of importance. (See, for example, **AMYL NITRITE** and **NITROUS ETHER**.)

**Nitrous Ether**, or **Ethyl Nitrite**, the nitrite of the organic radical "ethyl." It has the chemical formula  $\text{C}_2\text{H}_5\text{NO}_2$ , and is usually prepared by acting upon ethyl alcohol with nitric acid. It is a yellowish liquid having a specific gravity of about 0.90, and boiling at  $64^{\circ}$  F. It mixes readily with alcohol, but only to a slight extent



with water. It decomposes when kept in contact with water, evolving nitric oxid (NO). When mixed with about 20 times its own volume of alcohol (rectified spirit), it is known as "spirit of nitrous ether," or "sweet spirit of nitre," and is used in this form as a diuretic and febrifuge.

**Nitrous Oxid, or Nitrogen Monoxid,** a gaseous substance having the chemical formula  $N_2O$ , and obtained by heating ammonium nitrate,  $NH_4NO_3$ , as indicated by the equation



Care must be exercised in its manufacture, as ammonium nitrate, when heated, is liable to explosive decomposition. Nitrous oxid is a colorless gas, with a slightly sweet taste. It supports combustion nearly as well as oxygen, and when subjected to a pressure of 30 atmospheres at  $32^\circ F.$ , it condenses into a colorless, mobile liquid. When inhaled, it is apt to produce exhilaration, for which reason it is commonly called "laughing gas." Sir Humphry Davy, in experimenting with nitrous oxid about the year 1801, discovered that it produces insensibility when inhaled for a sufficient time, and in recent years it has been used as an anæsthetic for dental work and other minor surgical operations. Davy himself suggested this use in the following words: "As nitrous oxid, in its extensive operation, seems capable of destroying physical pain, it may probably be used with advantage in surgical operations in which no great effusion of blood takes place." It does not appear that the gas was so used, however, until 1844. On 10 December of that year Dr. Gardiner Q. Colton gave a lecture on "Laughing Gas," in Union Hall, Hartford, Conn., administering the gas to several of his auditors, for the purpose of illustrating its peculiar properties. Horace Wells, a Hartford dentist, was present at the lecture, and was impressed by the practical possibilities that appeared evident to him. On the following day Wells obtained a supply of the gas from Colton, inhaled it himself until he became unconscious, and while he was in this condition Dr. Riggs extracted one of his teeth. When consciousness returned, a few minutes later, he exclaimed, "I didn't feel it! The greatest discovery of the age!" About the same time Dr. William T. G. Morton and Dr. Chas. T. Jackson, of the Massachusetts General Hospital, at Boston, introduced ether as an anæsthetic, and a patent for its use was issued to them in November 1846. There has been much bitter controversy concerning the priority of Wells and of Morton and Jackson, as regards the introduction of anæsthetic methods in surgery; but so far as nitrous oxid is concerned, the evidence appears to favor Wells. Morton and Jackson experimented chiefly with ether, a substance which Wells appears to have used in his practice only upon one occasion. Consult 'The Locomotive' for November, 1889.

**Nitzsch, nitsh, Karl Immanuel,** German theologian: b. Borna, Germany, 21 Sept. 1787; d. Berlin, Germany, 21 Aug. 1868. He was a son of Karl Ludwig Nitzsch and was educated in Wittenberg, becoming professor of a theological seminary in Berlin in 1817 and in 1822-47 he was professor at Bonn. He then returned to Berlin where he was professor, university preacher and a member of the high consistory. He published: 'System der christlichen Lehre'

(1829); 'Praktische Theologie' (3 vols. 1847-67); etc.

**Niu-chuang, nū-chwāng', New-chwang, or Ying-tse,** China, a city of Manchuria, on the Liao-ho River, about 35 miles from its mouth. It is practically an inland city, but was chosen as one of the ports to be opened to foreign commerce by the treaty of Tien-tsin (1858). The foreign settlements and the trade, however, are at Ying-tse, near the river's mouth, which is known to Europeans as Niu-chuang. The port is connected by railway with Tien-tsin, and also with the great Siberian Railway. Though closed by ice in the winter months, it carries on an important trade. Ying-tse imports cotton, woolen, and silk goods, sugar, paper, metals, opium, tobacco, etc.; total value of imports in 1901, \$2,146,868; and exports beans, silk, ginseng, skins, and horns; total value of exports in 1901, \$3,651,880. The import of Indian opium has fallen from \$2,860,000 in 1866 to about \$40,000. Large quantities of salt are manufactured in the vicinity. The port was captured by the Japanese in March 1895, and was occupied by the Russians in 1900. See MANCHURIA. Pop. 60,000.

**Niué, nē-oo'ā, Niué-Fekai, or Savage Island,** in the South Pacific Ocean, politically dependent to New Zealand since 1900, is of ancient coral formation, 14 miles long, 10 miles wide, with a maximum altitude of 200 feet, and an area of 36 square miles. The soil is very productive, yielding coconuts, tara, yams, and bananas. Copra fungus, and straw hats are exported. Pop. (1903) 4,400, Malayo-Polynesians, all Christians, due to the labors of the London Missionary Society.

**Niv'en, William,** American mineralogist: b. Bellskill, Lanarkshire, Scotland, 6 Oct. 1850. After a common-school education in Scotland, he came to the United States in 1879, and pursued mineralogical investigations. He discovered four new minerals,—yttrialite, thorogummite, and nivenite in Llano County, Texas, in 1889, and aguilairite at Guanajuato, Mexico, in 1891. In 1891 he also found the remains of a prehistoric people, covering several hundred square miles in the state of Guerrero, Mexico. He was assistant commissioner of Arizona to the New Orleans Exposition.

**Nivernais, nē-vēr-nā,** France, an ancient province corresponding nearly to the present department of Nièvre.

**Nix, or Nixie,** in German folk-lore, the name of water spirits (male and female), haunting rivers, brooks, ponds, and lakes. See also NICKER.

**Nix'on, John,** American military officer: b. Framingham, Mass., 4 March 1725; d. Middlebury, Vt., 24 March 1815. In the expedition against Cape Breton in 1745 he fought under Sir William Pepperell and was at the capture of Louisburg. He joined the colonial forces at the outbreak of the American Revolution and fought at the battle of Lexington, and at Bunker Hill he commanded a regiment. He was made brigadier-general in 1777 and was given command of Governor's Island in New York harbor. He served under General Gates in the battle of Stillwater, and in 1780 failing health compelled his retirement.

## NIXON — NIZAM'S DOMINIONS

**Nixon, John**, American soldier: b. Philadelphia, Pa., 1733; d. there 31 Dec. 1808. He was early prominent in opposing the taxation demands of England, and in 1774 became a member of the first committee of correspondence in Pennsylvania; and was also a member of the committee of safety. In 1775 he became lieutenant-colonel of a battalion which he led at the battle of Princeton in 1777. In 1776 he commanded at Fort Island, and later in the same year was placed in command of the guard of the city of Philadelphia; he was the first to publicly proclaim the Declaration of Independence in the city on 8 July. He served in the army till 1780, and was a member of the navy board and director of the provision supply. He was one of the organizers of the Bank of North America, and its president from 1792 to 1808.

**Nixon, Lewis**, American shipbuilder: b. Leesburg, Va., 7 April 1861. He was graduated from the United States Naval Academy in 1882, and was then sent to the Royal Naval College at Greenwich, England, to take a special course in naval architecture from which he was graduated in 1885. In 1884 he had been appointed to the construction corps of the navy, and on his return from abroad was ordered to duty in connection with the building of the cruisers Chicago and Boston; he was later superintending constructor for the navy at the Cramp shipyard, and assistant constructor at the Brooklyn Navy Yard. In 1890 he designed the battleships of the Indiana class, and when the contract for these vessels was awarded to the Cramp shipyard, he resigned from the navy to become superintending constructor there. He retained this position until 1895, when he leased the Crescent shipyard at Elizabeth, N. J., where he built 100 vessels within six years, including the sub-marine torpedo boat Holland. In 1902 he became president of the United States Shipbuilding Company, which includes the Crescent shipyard, the Eastern Shipbuilding Company, and others; and he is also connected with other manufacturing interests. In politics he has been allied with the Democratic party; was appointed a commissioner of the East River Bridge in 1898; and in November 1901 succeeded Richard Croker as leader of Tammany Hall, resigning the position in May of the next year; he has also been chairman of the finance committee of the Democratic Congressional Campaign Committee.

**Nixon, Oliver Woodson**, American journalist: b. Guilford County, N. C., 25 Oct. 1825. He was graduated from Farmers' College, Ohio, in 1848, and from Jefferson Medical College, Philadelphia, in 1854. During the Civil War he was medical director of the Army of Missouri and in 1870 established the Cincinnati *Evening Chronicle*. With his brother, W. P. Nixon (q.v.), he merged it with the Cincinnati *Times*, and in 1878 they purchased the *Inter-Ocean* of Chicago, of which he has since been literary editor. He has published 'How Marcus Whitman Saved Oregon for the Union' (1895).

**Nixon, William Penn**, American journalist: b. Fountain City, Wayne County, Pa. He was graduated from Farmers' College, Ohio, in 1854 and from the law school of the University of Pennsylvania in 1859. He practised his pro-

fession in Cincinnati till 1860 and sat in the Ohio Legislature 1865-8. He was business manager of the Cincinnati *Chronicle*, 1868-72, and since the date last named has been associated with the Chicago *Inter-Ocean*, which he purchased with his brother O. W. Nixon (q.v.) as publisher, manager and editor. In 1897 he was appointed collector of the port of Chicago.

**Niza, nēt'sā, Marcos de** (also called FRAY MARCOS), Italian missionary in America: b. Nice at the beginning of the 16th century; d. between 1550 and 1570. He gets his name, de Niza, from the city of Nice, where he lived and entered the Franciscan Order. His governor-general Antonio de Mendoza, on the request of Marcos' bishop and friend Bartolome de las Casas, sent him about 1531 to New Galicia in order to reassure the Indians there that the purpose of the Spaniards was simply to convert the natives, not to enslave or conquer them. Fray Marcos lived successively in Peru, Guatemala and Mexico, and in 1539 undertook to explore the Northwest and to discover the truth of the story told by Cabeza de Vaca of the seven cities of Cibola and their golden wealth. Niza probably made his way into Arizona, and is frequently called the "discoverer of Arizona." Upon his return he published a book locating the "seven cities," for which he must have mistaken the Zuni pueblos. But the hopes to which he roused Mendoza were shattered by the expedition led by Coronado in 1540, which found no gold in Cibola. Niza's 'Descubrimiento de las siete ciudades' was edited by Ramusio, but is most accessible in a French version (1838).

**Nizami, nī-zā-mē'** (full name ABU MOHAMMED BEN YUSUF SHEIK NIZAM-ED-DIN), Persian poet: b. Western Persia 1141; d. Ganjah 1203. Besides a 'Divan,' or collection of lyrics, he wrote five larger poems, upon which his poetic fame rests, and which in Persia are regarded as masterpieces which no subsequent attempts have been able to equal. These poems are (1) 'Makhzan-al-asrar' ('Storehouse of Mysteries'), a didactic poem, in which theoretical doctrines as to ethics alternate with historical details, anecdotes, and fables; (2) 'Khusrau and Shirin,' a romantic epic, which has for its subject the love of the Persian king Khusrau for Shirin; (3) 'Laila and Majnun,' which describes the love of Majnun, a son of the Arabian desert, for the beautiful Laila; (4) 'Haft Paikar' ('Seven Portraits'), a collection of seven novels in a kind of poetical heptameron. The most famous of these tales is the 4th, called Turan-docht, which, after being subjected to various changes, furnishes the materials of Gozzi's and Schiller's well-known dramas; (5) 'Iskandar Namah' ('Alexander Book'), a traditional and embellished history of Alexander the Great, taken from the Greek poem on that subject by the pseudo Callisthenes. These five have been assembled in a collection known as 'Panj Ganj' ('The Five Treasures'). Nizami is not so familiar to western nations as Firdausi, Hafiz, or Sa'di; but in Persia he is among the foremost classics, and, in his peculiar field, may be placed second to Firdausi. 'Laila and Majnun' was rendered into English couplet verse by Atkinson (1836).

**Nizam's (nī-zāmz') Dominions.** See HYDERABAD.

**Nizhan**, nyé'zhān, or **Nyezhin**, nyé'zhēn, Russia, city in the government of Chernigof; on a branch of the Desna which flows into the Dnieper. It is in a fertile agricultural region in which tobacco is one of the principal products. It has a large trade in grain and tobacco. Pop. 33,000.

**Nizhni-Novgorod**, nēzh'ni-nōv'go-rod. See NIJNI NOVGOROD.

**Njord**, nyérd, in Scandinavian mythology, god of the wind and waves. See MYTHOLOGY.

**No Am'mon**, or **No**, the Hebrew designation for Thebes, the Disopolis Magnus of the Greeks. It is mentioned in Nah. iii. 8 (μέρος Ἀμμών) and in Ezek. xxx. 14-16; Jer. xlv. 25 (Διδωπόλις). The shorter form, **No**, seems to have prevailed generally among the Hebrews, and the Assyrian records call the city Ni, while in Egypt after the 21st dynasty it is written Nt, doubtless pronounced ne-t. Nahum's reference to it as "part of Ammon" makes its identity with Thebes positive. See THEBES.

**No-body Crab**, or **Sea-spider**. See PANTOPODA.

**No Man's Land**, a name applied to outlying districts in various countries; at one time to what is now mainly Griqualand East; also to a territory of 80,000 square miles in South Australia; to a small island near Martha's Vineyard, Mass.; to a strip of land bordering on Pennsylvania, Delaware, and Maryland, still in dispute between those States because of the displacement of the early boundary stones. Most commonly, however, the name is applied to Oklahoma in the following connection: In 1845 Texas, on being admitted into the Union, ceded to the United States that strip of her land which lay north of lat. 36° 30' N. This piece, 167 miles by 35, was without government until 1890, when it became a part of Oklahoma. At one time there was a great rush of prospectors and settlers to this section.

**No Name**, a novel by Wilkie Collins (q.v.) published in 1862.

**Noachian** (nō-ā'ki-an) **Precepts**, seven canons or laws which, according to the Talmud, were given by Jehovah to the sons of Noah. These precepts are analogous to what among the Romans was classed as Natural Law or *Jus Gentium*, a code revealed by the consensus of conduct among the Mediterranean nations. The seven Noachian Precepts enjoin: 1. Submission to civil authorities, kings, judges, etc. 2. Avoidance of idolatry and sacrilege. 3. Reverence to the name of God, as in taking an oath. 4. Proper restraint and direction of the human sexual instinct. 5. Reverence for life, even of animals, by refusing to consume the blood of beasts as food. 6. Respect for the rights of property. 7. Refusal to eat the member of a living animal. The expanding and refining genius of the Rabbins sometimes adds four others to these seven, namely: 1. The blood of a living animal is not to be drawn for the purpose of drinking it. 2. Animals are not to be mutilated. 3. Magic and sorcery are unlawful. 4. The crossing of animals and grafting of trees are also unlawful. No stranger was allowed to dwell in Hebrew territory unless he conformed to the Noachian Precepts and became a "proselyte of the gate"; in contradis-

tinction to the strangers who conformed by being circumcised, and were styled "proselytes of righteousness."

**Noack**, nō'āk, **August**, German painter: b. Darmstadt 1822. After painting under Sohn, Lessing and Schadow, in the Düsseldorf Academy (1839-42), he continued his student life in Munich and Antwerp, but eventually settled in his native town 1855, where he was made court painter and professor at the Polytechnic. He has painted several fine altar-pieces, and his 'Visit of Landgrave Philip the Magnanimous to Luther' (Rostock Gallery) and 'The Disputation at Marburg' (Darmstadt Gallery) give him high rank as a painter of historical pictures.

**Noah**, nō'ā, according to the Hebrew Scriptures, the son of Lamech, and 10th in descent from Adam. He was the first ancestor of the new race of men who should people the earth after the flood, in which points he is the counterpart of the Chaldaic Xithuthros, the Hindu Prithu, and the Greek Deucalion, severally. We read nothing of him from his birth till he is 500 years old, when we are told that he begat three sons, Shem, Ham, and Japheth. Having been warned by God of the coming flood, he built an ark or great vessel by the direction of Jehovah, into which he entered with his family and all kinds of animals of every kind. After the waters had subsided the ark rested on Mount Ararat, where Noah offered a burnt-offering to God, and was assured that the earth should never again be destroyed by a flood. This is the first passage in the Bible where altar or burnt-sacrifice is mentioned. As a sign of this covenant with Noah, God set the rainbow in the clouds. Noah died at the age of 950 years, 350 years after the flood. The narrative marks several important points in the history of civilization. In agriculture, the recognition of such seasons as seed time and harvest; and the discovery of the vine, which is made such a salient point in Greek mythology; the institution of sacrificial worship; the institution of civil government. The Noachian Precepts (q.v.) are founded on Genesis ix. 1-17.

**Noah, Mordecai Manuel**, American politician and journalist: b. Philadelphia 19 July 1785; d. New York 22 March 1851. Through the influence of Robert Morris he was appointed clerk in the auditor's office of the United States Treasury. On the removal of the national capital from Philadelphia to Washington, he resigned his clerkship, and was for a time reporter at the sessions of the Pennsylvania Legislature at Harrisburg. In 1813 he was appointed United States consul at Tunis, with a special mission to Algiers. Captured in the English Channel by an English war ship, on 3 July 1813, he was detained several weeks as a prisoner of war, and then released, next proceeding by way of Spain to his post of duty. He succeeded in ransoming the American prisoners whom the Algerians held in slavery, but was recalled on the pretext that his religion was incompatible with his consular position at Tunis. He was abundantly vindicated later. In those days the United States paid a yearly tribute of \$200,000 to Tunis for the privilege of navigating the Mediterranean. Noah denounced such payment, insisting that the money would be better spent in building war ships. Returning home in 1819

## NOAH — NOBEL

and settling in New York city he published a volume of his 'Travels in England, France, Spain and the Barbary States,' and founded the 'National Advocate.' In 1822 he was elected high sheriff of the city and county of New York. After the discontinuance of the 'National Advocate,' he began the 'New York Enquirer' which was merged with the 'Courier' and became the 'Courier and Enquirer,' in partnership with James Watson Webb, but political differences soon dissolved their connection. Appointed by President Jackson surveyor of the port of New York, he established in 1834 the *Evening Star* and became judge of the court of sessions. In 1842 he started a daily, *The Union*, which became a weekly and under the title, 'Noah's Sunday Times and Messenger,' was edited by him until his death. A most interesting project in which he engaged in 1820 was to re-establish the Jewish nation and form a place of refuge for Jewish emigrants on Grand Island, in the Niagara River, near Buffalo. In 1825 with impressive ceremonies, he laid the cornerstone of the proposed city at White Haven, but the new 'Ararat,' as it was termed, came to naught. Noah's literary activity was varied; it included a large number of addresses and essays, a translation of the 'Book of Yashar,' and many plays, some of them popular in their time. He was ever broad-minded and charitable, and a picturesque figure of his time. Consult: Wolf, 'Mordecai Manuel Noah: A Biographical Sketch' (1897); Morais, 'Eminent Israelites of the 19th Century' (1886).

**Noah, Samuel**, American soldier: b. London, England, 19 July 1779; d. Mount Pulaski, Logan County, Ill., 10 March 1871. Of Jewish descent and a cousin of M. M. Noah (q.v.), at 20 he emigrated to America, and was appointed 5 May 1805 cadet in the 1st Regiment of Artillery. He was graduated 9 Dec. 1807, was promoted ensign in 2d Regiment and after desultory service in the Gulf States resigned (13 March 1811) his commission of 1st lieutenant in the army. He joined Magee's Mexican forces which were besieged at Fort Bahia (14 Nov. 1812) by the Spanish royalists. On Magee's death, Noah in command of the rear-guard routed the enemy and captured San Antonio. War having been declared by the United States against England, Noah left Texas to re-enter the United States army, but on President Madison's refusal to re-commission him, volunteered as a private soldier to defend Brooklyn and served to the end of the war. At the time of his death he was the oldest graduate from West Point. Consult Cullom, 'Biographical Sketches of Deceased Graduates of the U. S. Military Academy.'

**Noah Claypole**. See CLAYPOLE, NOAH.

**Noah, Book of**, a legendary pseudobiographical book purporting to throw fuller light on the antediluvian and post-diluvian years of Old Testament history. Its date and authorship are equally uncertain.

**Noailles**, nō-i, French family from Limousin, dating from the 11th century. Its more important members are as follows: ANTOINE DE NOAILLES, b. 1504; d. Bordeaux 11 March 1562. He was admiral of France, ambassador to England 1553-6, the king's agent in the Truce of Vaucelles, and governor of Bordeaux.

His grandson, ANNE JULES DE NOAILLES, b. Paris 1650; d. Versailles 1708; was a servile courtier of the French king, who made him marshal of France in 1693. His son, ADRIEN MAURICE, DUC DE NOAILLES, b. Paris 29 Sept. 1678; d. there 24 June 1766; like his father was marshal of France (1734). Before this he had made his reputation by his financial policy and his opposition to Law. He fought in the war of the Polish Succession, became commander-in-chief of the army in Italy in 1735, and in the war of the Austrian Succession was crushingly defeated at Dettingen. His memoirs were edited by Rousset (1777) and his correspondence by Rousset (1865). His son LOUIS, b. Versailles 21 April 1713; d. Paris 22 Aug. 1793; fought in Flanders and Germany; became marshal of France in 1775. LOUIS MARIE, VICOMTE DE NOAILLES, b. Paris 1756; d. Havana 1804; married a sister of Lafayette's wife and with Lafayette urged French intervention, and fought in America in behalf of the American Colonies, in which he took refuge during the darkest days of the Revolution. He returned to France soon afterward, but resigned from the army in 1792, again came to America, and fought bravely in the French army in San Domingo, being killed in the brilliant capture of an English war vessel off Havana. PAUL, a great-grandson of Louis, b. Paris 4 Jan. 1802; d. there 12 May 1885; upheld the Bourbons and wrote 'Histoire de Mme. de Maintenon' (1848-58) and 'Histoire de la Maison de St. Cyr' (1865). His great-grandson, in turn, EMANUEL HENRI, MARQUIS DE NOAILLES, b. 15 Sept. 1830; d. 16 Feb. 1909; was French minister to Washington 1872, to the Papal Curia 1873, to Rome 1876-82, to Constantinople 1882-96, and 1896-1902 to Berlin; and wrote on Polish history. His brother JULES CHARLES VICTURNIEN, DUC DE NOAILLES (1826-95), was a well-known economist, one of the editors of the *Revue des Deux Mondes*, and author of many economic and historical studies.

**Nobbe**, nō'bē, Friedrich, German plant physiologist: b. Bremen, Germany, 20 June 1830. He was educated at Jena and Berlin, and in 1861 was called to a professorship at the Industrial School in Chemnitz. In 1868 he joined the faculty at the Academy of Forestry and Agriculture at Tharandt, where he founded an experiment station for plant physiology, and he originated, in 1869, scientific seed testing. He has published: 'Wider den Handel mit Waldgrassamen für die Wiesenkultur' (1876); etc.

**Nobel**, nō'bēl, Alfred Bernard: b. Stockholm, Sweden, 21 Oct. 1833; d. San Remo, Italy, 10 Dec. 1896. He was the third son of Emmanuel, and in 1842 his father moved with his family to Saint Petersburg, Russia. In 1850 he sent Alfred to the United States to study under the famous engineer John Ericsson. On reaching his 21st year the son returned to Saint Petersburg trained as an engineer and moreover able to speak fluently Swedish, Russian, English, German and French. Later he took up the study of chemistry and showed a marked preference for that science in its technical applications. Emmanuel Nobel went to Russia under contract to prepare mines and torpedoes for the Russian government, and erected on the Neva works for their manufacture which eventually

## NOBERT'S TEST-PLATES—NOBILITY

were extended to include the manufacture of firearms and agricultural implements.

After Alfred returned from America he was constantly engaged with his father in pursuing some invention. Among other substances nitroglycerin especially occupied their attention, and finally in 1862 they had erected a works at Helenborg, Sweden, where nitroglycerin was manufactured on a commercial scale for the first time in its history. In 1864 the works were destroyed by an explosion which killed the chemist, and Alfred's younger brother Oscar, and the calamity so affected Emmanuel Nobel as to bring on a paralytic stroke which left him permanently crippled. Alfred Nobel immediately erected new works on a barge anchored in Lake Mälaren and in 1865 enlisted capital to erect works on a large scale at Winterviken, Sweden, and Krümmel, Germany. So many accidents occurred with nitroglycerin, and especially the destruction of a vessel transporting it at Aspinwall on the Isthmus of Panama attracted such attention, that its transportation was interdicted by many governments. In the latter part of 1866 Nobel discovered dynamite which replaced it and which was at once manufactured in his Swedish and German factories and in 1868 at a factory which he started near San Francisco, Cal. In 1871 he erected at Ardeer, Scotland, the works which are now the largest dynamite works in the world. In fact dynamite met with such acceptance that works sprang up in all civilized countries, and while in 1867 but 11 tons were made, in 1882, 9,500 tons were produced and in 1900 the United States alone manufactured 42,923 tons. In 1875 Nobel invented explosive gelatine and the gelatine dynamites. In 1888 he invented ballistite. Alfred Nobel was interested in many other arts than that of explosives, having taken out in England alone 129 patents. With his brothers Ludwig and Robert he formed in 1878 the famous firm of Nobel Brothers that operated the petroleum wells at Baku, Russia, and has proved the most active competitor of the Standard Oil Company. He also purchased the large ordnance works at Bofors, Sweden, that he might the more readily carry out his inventions in ordnance and his investigations in metallurgy. At his death he left an estate worth over nine millions of dollars, and in his will, after leaving small legacies to his already wealthy relatives, directed that the residue should constitute a fund the interest from which should be divided into five equal amounts and awarded as prizes to the person who shall have made, (1) the most important discovery or invention in the domain of physics; (2) in chemistry; (3) in physiology or medicine; (4) who shall have produced in the field of literature the most distinguished work of an idealistic tendency; and (5) who shall have most or best promoted the fraternity of nations, the abolishment or diminution of standing armies and the formation and increase of peace congresses. Prizes (1) and (2) are awarded by the Royal Academy of Science in Stockholm; (3) by the Caroline Medical-Chirurgical Institute in Stockholm; (4) by the Swedish Academy in Stockholm, and (5) by the Norwegian Storting (Parliament). The statutes approved by King Oscar of Sweden require among other conditions "that every candidate for a prize . . . be proposed as such in writing by some duly

qualified person. A direct application for a prize will not be taken into consideration." "Every written work, to qualify for a prize, shall have appeared in print." "No work shall have a prize awarded to it unless it has been proved by the test of experience or by the examination of experts to possess the pre-eminent excellence that is manifestly signified by the terms of the Will." The announcements of the awards are made on 10 December when the prize is given together with a diploma and gold medal. It is expected that within six months thereafter the prize-winner will lecture upon the subject for which the prize is awarded at Stockholm, or, in the case of the Peace prize, at Christiania.

The will was contested by heirs but a compromise was effected on condition that a portion of the property be devoted to the founding of institutions for research known as Nobel Institutes, which has been done. The income from the residue of the estate permits, however, of five prizes, each approximating closely to \$50,000 in value, being awarded annually. Awards were made for the first time 10 Dec. 1901, prizes being given in physics to Wilhelm Conrad Röntgen of Munich, discoverer of the Röntgen rays; in chemistry to Jacob Henry Van't Hoff of Berlin, founder of the science of stereochemistry; in physiology and medicine to Emil von Behring, discoverer of diphtheria serums; in literature to Armand Sully-Prudhomme of Paris. The prize for peace was divided between Henri Dunant of Switzerland, prime-mover of the Geneva Convention and of the Red Cross societies, and Frederic Passy, founder of the Universal Peace Union.

In 1910, the Peace Prize which, in 1909 was divided between August Beernaert of Belgium and D'Estournelles de Constant of France, was awarded to an institution, the International Permanent Peace Bureau at Berne. The prize for literature went to the octogenarian German writer, Paul Johann Ludwig Heyse. The prize for physics was awarded jointly to Johannes Diederick Van der Waals, professor of experimental physics and director of the Physical Institute in Amsterdam and Guglielmo Marconi, the discoverer of wireless telegraphy. The prize for chemistry was given to Professor Otto Wallach, of the University of Göttingen, and the medical prize to Professor Albrecht Kossel of Heidelberg, for pioneer work in the artificial production of organic material.

CHARLES E. MUNROE,

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No'bert's Test-plates, finely-ruled glass plates so named from F. Nobert, a German optician, used for testing the power of microscopes. The rulings are executed on the under surface of a piece of exceedingly thin glass by means of a diamond point. Some of these ruled plates have the almost incredible number of 225,187 spaces to the inch. As means of testing the power of the microscope they are superior to any other object.

Nobility, in European countries, a certain rank or class of society which possesses hereditary honors and privileges above the rest of the citizens. Such a class is found in the infancy of almost every European nation. Its origin may be attributed to military supremacy, to the hon-

## NOBLE — NOBLESVILLE

ors paid to superior ability, or to the guardians or royal rulers of the nation. Among the Romans the patricians originally formed the nobility; but a new order of nobility arose out of the plebeians, consisting of those who had held curule magistracies and their descendants, enjoying the right of having images of their distinguished ancestors. Among the ancient German tribes only obscure traces of hereditary nobility are found. The dignities of the counts of the Franks, the aldermen and great *thanes* of England, as also of the *jarls* (in England *eorlas*) of Denmark, were accessible to every one distinguished by merit and favored by fortune. In Venice a civic nobility grew up consisting of a series of families who gradually acquired all political power and kept it to themselves and their descendants. In England hereditary nobility, the nobility belonging to the titles of duke, marquis, earl, viscount, and baron, is now entirely personal, though formerly, as a result of the Norman conquest, it was connected with the holding of lands.

In Spain and Italy still the same rank depends in greater measure upon property; and in France and Germany the *de* and *von* of titles points to the same fact. In France and Germany nobility is common to all the members of the noble family, and the German nobility form a very exclusive caste. In France and Germany the nobles long formed a class of petty sovereigns within their own domains. The French Revolution first deprived the nobles of that country of their privileges and exclusive rights, as that of jurisdiction, etc.; and the decree of 19 June 1790 abolished hereditary rank entirely. Under Napoleon I. arose a new hereditary nobility, with the titles of princes, dukes, counts, barons, and chevaliers, which descended to the eldest son. After the restoration of the Bourbons (1814) the ancient nobility reclaimed their former rights and privileges. Nobility was again abolished in 1848, but was restored by Napoleon III. In Norway the parliament abolished nobility by the three successive decrees of 1815, 1818, and 1821.

In Great Britain titles of nobility can only be conferred by the sovereign, and that by patent, in virtue of which they become hereditary. Life peerages also are occasionally conferred. The nobility, as the term is commonly used, consists of those holding the titles already mentioned (or all above the rank of baronet) and their more immediate connections; but if the term were to be used as generally in Europe the gentry would also be included, or all families entitled to bear coat armor. Those of the nobility who are peers of England, of Great Britain, or of the United Kingdom, have a hereditary seat in the House of Lords, while the Scottish peers elect 16 of their number to represent their order, and the Irish peers elect 28 representatives for the same purpose. There is no nobility in America, the Federal Constitution declaring that "No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state." Congress sparingly gives its consent for a person in the service of the government to accept a decoration or other mark of honor from another government.

**Noble, Alfred**, American civil engineer: b. Livonia, Mich., 7 Aug. 1844. He graduated from the University of Michigan in 1870, and then engaged in civil engineering. He was a member of the Nicaragua Canal Board in 1895, of the United States board of engineers on deep waterways in 1897-1900 and of the Isthmian Canal Commission in 1899-1903.

**Noble, Sir Andrew**, English physicist: b. Scotland 13 Sept. 1832. He was educated at Edinburgh Academy, and is an authority on army ordnance and explosives. He was assistant inspector of artillery in 1859, and since 1860 has been a member of the firm of Sir W. G. Armstrong, Whitworth & Company. He became high sheriff of Northumberland in 1896.

**Noble, Annette Lucile**, American author: b. Albion, N. Y., 12 July 1844. She was graduated from Phipps Union Seminary in 1863, and has since devoted herself to literature and traveling. She has published: 'Uncle Jack's Executors' (1880); 'After the Failure' (1887); 'The Crazy Angel' (1901); etc.

**Noble, Edmond**, English author and journalist: b. Glasgow, Scotland, 8 Jan. 1853. He was educated in Lancashire, and entered journalism in 1872 as reporter on the *St. Helen's Newspaper and Advertiser*. In 1882 he became proprietor of the *Liverpool City News*, and was in Russia as correspondent of the *London Daily News*, and other London journals, in 1882-4. He was a foreign editorial writer of the *New York Herald* in 1887, and edited the American edition of 'Free Russia' 1892-4. He has published 'The Russian Revolt' (1885); 'Russia and the Russians' (1900); 'Before the Dawn' (1901).

**Noble, Frederick Alphonso**, American Congregational clergyman: b. Baldwin, Maine, 17 March 1832. He was graduated from Yale University in 1858, and from Andover Theological Seminary in 1861. He held various important charges until 1901, when he resigned. He has been prominently connected with the leading missionary conferences of his church, and has written: 'Divine Life in Man' (1896); 'Typical New Testament Conversions' (1901); etc.

**Noble, John Willock**, American lawyer: b. Lancaster, Ohio, 26 Oct. 1831. He was graduated from Yale University in 1851 and engaged in law practice. He was city attorney of Keokuk, Iowa, at the outbreak of the Civil War, when he enlisted and served through the war, rising to the rank of brevet brigadier-general. In 1867-70 he was United States attorney for Missouri at Saint Louis, and in 1889-93 secretary of the interior in President Harrison's cabinet. He has resumed his law practice in Saint Louis.

**Noble**, in numismatics, an ancient English gold coin, six shillings and eightpence, or \$1.66, first struck in the reign of Edward III., 1344. Half-nobles and quarter-nobles were also in circulation at the same period.

**Noblesville**, nō'b'iz-vīl, Ind., city, county-seat of Hamilton County, on the White River, and on the Lake Erie & W. and the Chicago & S. E. R.R.'s; about 18 miles north by east of Indianapolis. It was settled in 1824, and in 1839 was incorporated. It is in an agricultural region and in a natural gas belt. Its chief manufactures are flour, foundry products, and strawboard. It



## NOBUNAGA — NODULAR DISEASE

has grain elevators, enameling and carbon works. There is considerable trade in the manufactured articles and farm products. The charter of 1890 provides for a mayor, who holds office four years, and a council. Pop. (1890) 3,054; (1900) 4,792; (1910) 5,973.

**Nobunaga**, nō-boo-nā'gā, Japanese general and statesman: b. Owari 1533; d. Kioto 1582. He was son of a soldier and small landholder, and to the little property left him in 1549 by his father rapidly added more, so that in 1559 he had control of the entire province of Owari. Thence, with the assistance of his lieutenant, Hideyoshi, he made bold forays into neighboring provinces. In 1567 he made an alliance with Yoshiaki, younger brother of the lately assassinated shogun, and, having put him upon the throne in 1568, was appointed vice-shogun, in which office he put down all opposition, crushed the political power of Buddhism, and encouraged the Jesuit missions, no doubt merely to countervail the influence of the Buddhists. Yoshiaki, attempting an alliance against Nobunaga, was deposed in 1573, and Nobunaga took the powers but not the titles of the shogunate, thus forwarding the work of political reform. In 1582 one of his lieutenants, angered, says legend, by a practical joke of Nobunaga, turned against him, hemmed him in in a temple in Kioto, and set fire to the building. Nobunaga committed hari-kari. Consult: Dening, 'Life of Hideyoshi' (1890); Brinkley, 'Japan' (1901).

**Noctes Ambrosianæ**, nōk'tēz ām-brō-sī-ā'-nē. See BLACKWOOD, WILLIAM; WILSON, JOHN.

**Noctilu'ca**, a luminous flagellate protozoan (*Noctiluca miliaris*), extremely abundant throughout all seas, and one of the chief causes of the "phosphorescence" of the waves. It is a spherical animal—large for an infusorian (.02 inch in diameter)—and moves by means of a long stout lash or flagellum, beside which there is a second, very much smaller, lying in the "mouth" region. Its substance is remarkably spongy, and the phosphorescence is said by Allman to have its seat just underneath the tough rind which is its most peculiar characteristic. It represents, with a similar form (*Leptodiscus*), the order *Cystoflagellata*. See FLAGELLATA.

**Noctu'idæ**. See MOTHS; OWLET-MOTHS.

**Noc'turne**, (1) in art, a painting exhibiting some of the characteristic effects of night light. Whistler has produced various nocturnes which have given rise to considerable controversy. (2) In music, the term denotes a composition in which the emotions, particularly those of love and tenderness, are developed. The nocturne was invented by John Field (q.v.), and has become a favorite style of composition with modern pianoforte composers. Chopin is the most famous of nocturne composers. See CHOPIN; FIELD, JOHN.

**No'dal Lines and Points**. See NODE; HARMONICS.

**Nod'dy**, a dark brown tern (*Anous stolidus*), widely diffused through the northern and southern hemispheres, and well known to sailors for its fearlessness, regarded as stupidity, allowing itself even to be taken by the hand; but this is true only of birds rarely or never disturbed by men. The noddy is a rare visitant to northern shores, but is very abundant in warmer climates, as in the West Indies and South Seas, where its

eggs are gathered from certain lonely islets in immense quantities and used as food.

**Node**, (1) in astronomy, the two points in which the orbit of a planet intersects the plane of the ecliptic; the one through which the planet passes from the south to the north side of the ecliptic being called the ascending node, and the other the descending node. As all the bodies of the solar system, whether planets or comets, move in orbits variously inclined to the ecliptic, the orbit of each possesses two nodes, and a straight line drawn joining these two points is called the line of nodes of each body. It is scarcely necessary to add that as the earth moves in the plane of the ecliptic she has no nodes. The places of the nodes are not fixed points on the plane of the ecliptic, but are in a constant state of fluctuation, sometimes advancing (eastward), and at other times receding (moving westward). This motion is produced by the mutual attractions of the planets, which tend to draw each of them out of the plane of its orbit; and it depends upon the relative positions of the planets with respect to another planet whether that planet's nodes shall advance or recede. (2) In physics, a point in a vibrating body, or system of vibrating particles, where there is no movement. When a body is vibrating, the vibratory motion is conveyed from one place to another by the action of the molecular forces of the particles on one another. If a plate of glass or metal be held in the hand, and a bow be drawn across the edge, particles of fine sand, previously placed on the plate, will arrange themselves in lines, along which it is evident no vibration has taken place. These lines, called nodal lines, generally form geometrical figures. (3) In botany, the joint of a stem, or the part where a leaf or several leaves are inserted.

**No'diak**, a Papuan animal. See ECHIDNA.

**Nodier**, Charles, shārl nō-dē-ā, French author: b. Besançon, France, 29 April 1780; d. Paris 27 Sept. 1844. At an early age he proceeded to Strasburg, where he studied under Eulogius Schneider, and, returning to his native district, gave much of his attention to natural history. In 1798 he became assistant librarian at Besançon. Soon drawn into connection with royalist clubs, he wrote with great acrimony against Bonaparte. These philippics subjected him to prosecutions, and even to imprisonment. For several years he lived concealed in the Jura, and then fled to Switzerland, where he supported himself as a corrector of the press until, after many adventures, he returned to France. In 1814 he went to Paris, where Louis XVIII. rewarded him with a title of nobility and the cross of the Legion of Honor. In 1824 he was appointed librarian to the arsenal, and in 1834 admitted a member of the Academy. As a critic he is known by a series of excellent editions of the French classics with notes. As a grammarian and lexicographer he published: 'Dictionnaire des Onomatopées de la Langue française'; 'Examen critique des Dictionnaires de la Langue française'; 'Dictionnaire universel de la Langue française'; and 'Elements de Linguistique.' Among his many other works, many of them fictions of the romantic school, are: 'Stella ou les proscrits' (1802); 'Trilby ou le Latin d'Argail' (1822).

**Nod'ular Disease**. See SHEEP, DISEASES OF.

## NOÉ—NOLLE PROSEQUI

**Noé, Amédée de**, ā-mā-dā dē nō-ā. See CHAM.

**Noel, nō'ēl, Baptist Wriothsley**, English clergyman: b. Leightmont, Scotland, 10 July 1799; d. Stanmore, Middlesex, 20 Jan. 1873. A brother of the first earl of Gainsborough, he was graduated from Cambridge University in 1826, entered the Anglican ministry and was incumbent of Saint John's, Bedford Row, London. In 1848 he quitted the Establishment for the Baptist fold, became widely known as a Baptist minister in London, and was prominent in philanthropic labors in the metropolis. He published 'Essay on Christian Baptism' (1849); 'The Union of Church and State' (1848); 'Freedom and Slavery in the United States of America' (1863); 'Hymns About Jesus' (1869); etc.

**Noel, Roden Berkeley Wriothsley**, English poet: b. England 1834; d. Mainz, Germany, 26 May 1894. He was a son of the Earl of Gainsborough. He was educated at Cambridge, and though never a popular poet his work appeals to highly educated readers and is much of it rich in melody, though too voluminous to keep entirely to his best standard. His published volumes include 'Behind the Veil and Other Poems' (1863); 'A Little Child's Monument' (1881); 'A Modern Faust and Other Poems' (1888); etc.

**Noel, Thomas**, English poet: b. Kirkby-Mallory, England, 11 May 1799; d. Brighton, England, 16 May 1861. He was graduated from Merton College, Oxford, 1824 and was the author of the famous poem 'The Pauper's Drive,' often credited to Hood. Among his other works are: 'The Cottage Muse' (1833); 'Rhymes and Roundelays' (1841).

**No'emi**, a romance by Sabine Baring-Gould, published in 1895. It is a tale of Aquitaine, during the English occupation, in the early 15th century.

**Noetians**, nō-ē'shī'anz. See SABELLIUS.

**Noetic Consciousness**. See METAPHYSICS.

**Nogales**, nō-gā'lēs, Mexico, town in the state of Sonora; on the Santa Cruz River, on the boundary between Mexico and Arizona, and on the Sonora Railroad. A United States consui is stationed here.

**Nogaret, Stanislas Henri Lucien de**, stān-ēs-lās ōn-rē lū-sē-ōn dē nō-gā-rā, French colonist in America: b. Marseilles 1682; d. Paris 1759. He studied law; ran away from college; served in the army in Canada until 1716; and then was sent to Louisiana where he became Bienville's lieutenant in the bloody wars with the Natchez Indians described by Nogaret in his 'Précis des Etablissements fondés dans la Vallée du Mississippi par le Chevalier Le Moynes de Bienville' (1738). From 1735 until his death Nogaret resided in France and acted as director of the Louisiana Company.

**Noiré, nwā-rā, Ludwig**, German philosophical writer: b. Alzey, Hesse, Germany, 26 March 1829; d. Mayence, Germany, 26 March 1889. He was educated in Giessen and taught for many years in the gymnasium at Mayence, giving himself meantime to philosophical study. He wrote: 'Die Welt als Entwicklung des Geistes' (1874); 'Einleitung und Begründung einer monistischen Erkenntnisstheorie' (1877); 'Logos' (1885).

**Noiseless Powder**. See EXPLOSIVES.

**Noisseville**, nwās-vēl, France, a village five miles east of Metz, celebrated as the scene of Bazaine's attempt to break through the line of German besiegers 31 Aug.-1 Sept. 1870. With 120,000 men and 600 guns, he attacked Mantheyll with 41,000 men and 138 guns, drove him back and took the villages of Montoy, Servigny, and Courcy, but German reinforcements arriving on the second day, Bazaine was compelled to fall back upon Metz.

**Nola**, nō'lā, Italy, city in the province of Caserta; 16 miles east by north of Naples. It is said to have been founded by the Etrurians before Rome was built, and 313 B.C. it became a part of the Roman territory. It successfully resisted an attack of Hannibal in the Second Punic war. Nola claims to have made, in the 5th century, the first bells used in Christian churches. Giordano Bruno (q.v.) was born in Nola and Augustus died here in 14 A.D. Pop. about 16,000.

**Nöldeke, nēl'dē-kē, Theodor**, German orientalist: b. Harburg, Germany, 2 March 1836. He was educated at the gymnasium of Lingen, Hanover, and at the University of Göttingen. In 1859 he won the prize offered by the French Académie des Inscriptions with his history of the Koran, which he wrote in French and translated into German in the following year. He was privat-docent at Göttingen in 1861-4 and then was appointed assistant professor there. In 1860-72 he occupied the chair of theology at Kiel and was then called to the professorship of Oriental languages at Strasburg. A scholar of wide attainments he has made a specialty of the Semitic languages and of Oriental philology and history, in which departments he is a leading authority. He is a voluminous writer and much of his work is intended for specialists only, yet much of his writing is intended for the general public and he has contributed to several encyclopædias. He has published: 'Über die Mundart der Mandäer' (1862); 'Die Gedichte des Urwa ibn Alward' (1863); 'Das Leben Muhammeds' (1863); 'Die Alttestamentliche Litteratur' (1864); 'Grammatik der Neusyrischen Sprache' (1868); 'Untersuchungen zur Kritik des Alten Testaments' (1869); 'Mandäische Grammatik' (1874); 'Aufsätze zur persischen Geschichte' (1887); 'Orientalische Skizzen' (1892), translated into English in that year and revised by him; etc.

**Nolhac, Pierre de**, pē-ār dē nōl-āk, French historian: b. Ambert 15 Dec. 1859. He studied at the French school in Rome, worked for a year in the Bibliothèque Nationale, in 1886 became professor of history and classical philology in the Ecole des Hautes Etudes, and in 1892 was appointed conservator of the Versailles Museum. Among his literary and historical studies are: 'Lettres de Joachim du Bellay' (1884); 'La Bibliothèque de Fulvio Orsini' (1887); 'Erasmus en Italie' (1888); 'Marie Antoinette' (1890); 'Petrarque et Humanisme' (1892); 'Histoire du Château de Versailles' (1899-1900); and 'Louis XV. et Marie Lezinska' (1901).

**Noll**, nōl, a name by which Oliver Cromwell (q.v.) was popularly known.

**Nolle Prosequi**, nōl'ē prōs'ē-kwī (to be unwilling to prosecute) in law, is a stoppage of proceedings by a plaintiff, and is an acknowledgment that he has no cause of action. It is

## NOLLEKENS — NON-COMMISSIONED OFFICERS

resorted to for the most part when the plaintiff has misconceived the nature of the action, or the party to be sued. In the United States the government—Federal, State or Municipal—through its attorney often enters a *nolle prosequi*, especially where there exists a lack of evidence for the prosecution.

**Nollekens**, nöl'ë-kěnz, **Joseph**, English sculptor: b. London 11 Aug. 1737; d. there 23 April 1823. He was the son of a painter of Antwerp, who had settled in England and after studying sculpture at Rome became very successful in the execution of portrait busts. He modeled busts of George III., Pitt, Canning, and Castlereagh. His finest ideal statue is 'Venus with the Sandal.'

**No'ma**. See **CANCERUM ORIS**.

**Nom'ads**, a general name given roaming or wandering people or tribes without fixed habitations. Nomadic tribes are seldom found to quit their wandering life until they are compelled to do so by being surrounded by tribes in settled habitations, or unless they can make themselves masters of the settlements of a civilized nation. But this change commonly takes place by degrees. Some of the greatest revolutions in history have been effected by these wandering tribes. North Africa, the interior of South America, and the northern and middle parts of Asia, are still inhabited by nomadic tribes. Different tribes, however, possess different degrees of civilization. Some are little better than bands of robbers.

**No'marchy**, or **Nome**, the largest political division of Greece; a subdivision of a nomarchy is an eparchy, and a subdivision of an eparchy is a demarchy. There are 26 nomarchies in Greece. The government appoints the nomarch who rules or governs a nomarchy. The time which he holds office is indefinite, but the members of the council, who assist him, are elected by the people for a certain definite time.

**Nombre de Dios**, nôm'bră dă dē'os, Mexico, city in the state of Durango; about 150 miles from the Gulf of California, and 30 miles southeast of Durango, the nearest railroad station. It is situated in a region noted for its extensive deposit of silver ore. Pop. 10,826.

**Nome**, nôm, Alaska, city in the western part; on the north shore of Norton Sound (q.v.) at the mouth of Snake River; 14 miles west of Cape Nome. It is the commercial centre of an extensive gold mining district in the western part of the Territory, including a large part if not all of Seward Peninsula, as the gold mining district which contributes to the wealth of Nome increases in extent as new fields are prospected. The placer gold fields, so dependent upon water for their development, are not continuous; rich deposits may have long intervening stretches where as yet no gold has been found. Nome came into existence as a mining camp in 1898-9 when gold was discovered in the creeks and streams of the vicinity, and the value of the beach deposits was recognized. Angelo Heilprin, president of the Philadelphia Geographical Society, is authority for the statement that out of the Nome sands "in barely more than two months" has been taken over \$1,000,000 by the crude method of "rocking." Nome is the shipping point for Council City, second in size to Nome. The tin found in the vicinity of Cape

Prince of Wales, and at Cape York, 90 miles northwest of Nome, is of industrial interest to Nome. Short narrow gauge railroads connect several of the mining camps with the city. The gold output for 1901 was about \$7,000,000. The harbor is closed by ice the greater part of the year, so that the city is active only from June to October. The city government is well organized, with all the departments essential for proper maintenance and operation. The streets are lighted by electricity; it has a good water system, free mail delivery, and many of the modern conveniences found in cities in older settlements of the United States. The population in summer is much larger than in winter. Pop. (1910) 2,600. See **ALASKA**, **RECENT DEVELOPMENT OF**.

**Nome, Cape**. See **CAPE NOME**.

**Nome**, (1) in music (especially in ancient Greek) any melody which was made up from or depended on natural or inviolable rules. (2) A province or other political division of a country, especially ancient Egypt and modern Greece. See **NOMARCHY**.

**Nom'inalism**, in the Middle Ages, a name of one of two rival schools of philosophy dating from the time of Plato. The discussion arose respecting the nature of our general or abstract ideas, or of "universals." It was contended by some that abstractions—as a circle in the abstract, beauty, right—had a real existence apart from round things, beautiful objects, right actions. This was called realism. Those who held the opposite view were called Nominalists, because they maintained that there is nothing general but *names*; the name "circle" is applied to everything that is round, and is a general name; but no independent fact or property exists corresponding to the name. Specifically the controversy was as to the existence of "universals" or of genera and species, and arose out of a passage in the Latin translation of Porphyry's 'Isagoge.' Roscellinus, canon of Compiègne, in the latter part of the 11th century, was the first advocate of nominalism, and maintained, in opposition to the advocates of realism, that general ideas have no separate entity. He was charged with holding heretical opinions concerning the Trinity, for which he was cited before the Council of Soissons, and condemned 1092 A.D. His first great opponent was Anselm, Archbishop of Canterbury, and later Abelard, who had been a pupil of Roscellinus, modified his master's views into what is known as conceptualism.

**Nomina'tion**. See **CAUCUS**.

**Nomoc'anon**, in the Greek Church, a systematic collection of ecclesiastical laws, including certain secular enactments, especially imperial decrees, which have an ecclesiastical bearing. The most important is the *Nomocanon* of Photius (883) which was republished at Rome 1842 in the 'Spicilegium Romanum.'

**Non-activity**. See **NEUTRALITY**.

**Non-com'batants**, a term used in warfare for officers and privates charged with administrative duties and who do not fight unless in self-defense.

**Non-commissioned Officers**, in the army are officers intermediate in rank between the commissioned officers and privates or marines.

## NON COMPOS MENTIS—NONPAREIL

They are selected from among the latter, and are generally the most meritorious of these. They vary in rank, and comprise sergeants-major, sergeants, drum-majors, corporals. Their duties are various, but in general it may be stated that they overlook the men when off parade and while in barracks. They can only be reduced to the ranks by the colonel-commandant or by court-martial. A grade of officers above non-commissioned officers are the warrant officers. See ARMY OF THE UNITED STATES.

**Non Compos Mentis**, *nõn kõm'põs mën'tis* ("not of sound mind") an expression used of a person who is not of sound understanding. See INSANITY.

**Non-Euclidean Geometry.** See GEOMETRY.

**Non-intru'sionists**, those members of the Scotch Established Church who contended for the principle that no minister should be intruded on a parish contrary to the will of the congregation. The name originated in a resolution, bearing this import, proposed by Dr. Chalmers and seconded by Lord Moncrief in the General Assembly of 1833. It was to meet these views that the General Assembly, in 1834, passed the Veto Act, which brought the Church into conflict with the law courts, and produced the disruption from which the Free Church of Scotland came into being.

**Non Pos'sumus**, an expression said to have been used by Pope Clement VII. in reply to Henry VIII.'s demand for the dissolution of his marriage with Catharine of Aragon; used in general expression for the refusal of the Roman Catholic Church to yield to the demands of the temporal power.

**Non-resistance, Doctrine of**, is, that it is unlawful, on religious grounds, to resist the commands of a ruler or magistrate. The New Testament writers urge the necessity of obedience to those in authority, although, as usually understood, this teaching refers only to lawful commands. It has, however, been maintained that obedience is to be rendered to all the commands of a ruler without exception. The doctrine is closely connected with—may indeed be said to proceed from—the doctrine of the divine right of kings. Hobbes maintained the absolute supremacy of kings, and their right to exact unquestioning obedience from their subjects. This view was the outcome of his social contract theory. In modern times the doctrine has become completely exploded.

**No'ne**, or **En'ne**, the ninth member of the series of the saturated fatty hydrocarbons, or paraffins. It has the chemical formula  $C_9H_{20}$ , and is theoretically capable of existing in no less than 35 different isomeric forms, a number of which have been actually identified. Two of these, having a common specific gravity of about 0.742, and boiling at  $266^\circ$  F. and  $277^\circ$  F., respectively, are known to exist in ordinary petroleum.

**Non-confor'mists**, those who refuse to join the Established Church in England as by law established. The first Act of Uniformity was passed under Edward VI. 1549. But the term was particularly applied to these clergymen who were ejected from their livings by the Act of Uniformity passed under Charles II. in 1662. Their number was about 2,000. The act required

that every clergyman should be ordained by a bishop; should assent to everything in the Book of Common Prayer; take the oath of canonical obedience; abjure the Solemn League and Covenant; and swear allegiance to the king. The Presbyterians, Independents, etc., refused to conform, and were exposed to persecution. By the Five Mile Act (1665) no dissenting teacher who would not conform, could approach within 5 miles of any corporation, or of any place where he had preached after the act of obligation; and should thus be deprived of all means of subsistence. The term was subsequently widened so as to comprehend not only the pastors but their flocks. On the accession of William III. all was changed by the Toleration Act. Some of those oppressive provisions were revived during the reign of Queen Anne, but were finally repealed in 1718. The name *Non-conformists* was under these altered circumstances changed to that of *Dissenters*. The repeal of the Corporation and Test Acts in 1828 removed the civil disabilities under which Dissenters had previously been placed; and their other grievances, including those in regard to marriage, church rates, burials in parish church-yards, and university tests were subsequently redressed. See PURITANS; DISSENTERS.

**Nones**, *nõnz*, in the Roman calendar, the fifth day of the months January, February, April, June, August, September, November, and December, and the seventh day of March, May, July, and October. The *nones* were so called as falling on the *ninth* day before the ides, both days included. See CALENDAR.

**Nonius**, *nõn'üs*, **Marcellus**, Latin grammarian: b. Thubursicum in Numidia at the opening of the 4th century A.D. His 'De Compensiosa Doctrina,' originally consisting of 20 books, is greatly esteemed on account of its many quotations from earlier writers whose works are lost. The 16th book is no longer extant. Consult editions by Quicherat (1871) and L. Müller (1888); also Nettleship, 'Essays in Latin Literature' (1885).

**Nonjur'ors**, in British history, those who refused to take the oath of allegiance to the government and crown of England at the Revolution, when James II. abandoned the throne. The nonjurors numbered upward of 400 clergy, including one archbishop and eight bishops.

**Nonnus**, *nõn'üs*, Greek poet of the 5th century of our era. He wrote the 'Dionysiaca,' an epic poem in 48 books relating the journeys and expeditions of Dionysus in lively and poetic style, full of taste and learning. He was a Christian and produced a poetic paraphrase of St. John's Gospel. Consult: Ludwich, 'Beiträge zur Kritik des Nonnos' (1873).

**Nonpareil'**, a small and beautiful finch (*Cyanospiza ciris*) of the South Atlantic and Gulf States. It is nearly related to the indigo-bird (q.v.), and is frequently kept as a cage-bird, especially by the French people of southern Louisiana, who call it *le pape* (the pope). It is about the size of a canary, and, in the male, ultramarine blue over the whole head and neck, excepting a narrow stripe from the chin to the breast, which, with the under parts generally and the rump, is vermillion red; there are touches of green about the shoulders. The female is clear dark green above and yellowish on

## NONSENSE — NORDENFELT

the lower surfaces. Its song is a series of melodious warblings, and its nest is placed in bushes and low trees, and contains pearly white eggs marked with purplish and reddish brown.

**Nonsense, Fort**, in American history, the name of a former fort near Morristown, N. J., projected by Washington to keep his discouraged and famished army from revolting during the winter of 1779-80. The Washington Association of New Jersey erected a memorial stone on the site of the earthworks in 1888.

**Non'suit**, in law. See **NOLLE PROSEQUI**.

**Non'yl**, or **En'nyl**, in chemistry, the organic radical  $C_9H_9$ , whose hydride is the paraffin nonane (q.v.). Nonyl is analogous in its chemical behavior to ethyl and methyl, and, like these, it cannot exist in the free state. The derivatives of nonyl have been very little studied as yet, because they are of no commercial importance, and their relations are exceedingly complicated, owing to the large number of possible isomeric forms that each of them can have. Several of its alcohols, amines and chlorides have been prepared, however.

**Non'ylene**, or **En'nylene**, the ninth member of the olefine series of fatty hydrocarbons. It has the chemical formula  $C_9H_{18}$ , and is capable of existing in many isomeric modifications. All of these modifications that are known are liquid. One of them, which may be prepared from one of the nonyl chlorides (see **NONYL**), has a specific gravity of 0.853, and boils at 275° F. Another, which occurs in the distillates from bituminous shales, has a specific gravity of 0.753 and boils at 250° F. A third, which occurs among the products obtained by distilling anyl alcohol with zinc chloride, boils at 284° F.

**Nootka** (noot'ka) **Indians**, a name given to several North American Indian tribes of the Wakashan family, residing on Vancouver Island. In 1792 they were called Wakash Indians. About 2,500 of them remain, over half of whom are nominally Christians.

**Nootka Sound**, Canada, an indentation on the west coast of Vancouver's Island. See **VANCOUVER'S ISLAND**.

**Nor'bert**, **Saint**. See **PREMONSTRATENSIA**.

**Norchia**, nôr'che-a, **The Biga** of, in archæology, a name given to the remains of a biga, or two-horse chariot, discovered in 1901 in the course of some excavations undertaken by a country builder at Norchia, a small town almost 30 miles north of Rome, in what was once a populous part of Etruria. With it were found a number of bronze vessels and some pieces of pottery, of a character familiar among Etruscan remains. These remains were purchased by the Metropolitan Museum of Art in New York, and placed on exhibition. To set the fragments up it was necessary to reconstruct the original chariot. The wheels alone retained their shape. This entailed a work of great delicacy and difficulty, which was accomplished with great skill.

**Nor'cross**, **Frank W.**, American trade journalist: b. Bangor, Maine, about 1831; d. Philadelphia 21 March 1903. He removed to New York in 1857, and there founded with J. D. Dexter 'The Shoe and Leather Reporter,' the earliest trade journal, but one, in the country. He published: 'The History of the New York Swamp';

'A Hundred Years' History of the Shoe and Leather Trade in America' (1903).

**Nord**, nôr, France, a northeastern frontier department bordering on Belgium and the North Sea; area, 2,229 square miles. Capital, Lille. The coast, marked by a long chain of sandy hillocks, furnishes the two harbors of Dunkirk and Gravelines. The interior is a monotonous but fertile alluvial flat, intersected by sluggish streams and canals. The department is essentially agricultural, upward of four fifths of the area being under cultivation. The principal mineral is coal. The iron mines are also very productive.

**Nordau**, nôr'dow, **Max Simon**, German physician and author: b. Budapest, Hungary, 29 July 1849. He studied at the University of Budapest, receiving his degree in 1872; he then traveled for six years, visiting the principal countries of Europe, and in 1878 began the practice of medicine in Budapest. In 1880 he went to Paris, and after two years of study resumed the practice of his profession there. He began his literary career at Budapest before entering the University as contributor and dramatic critic for 'Der Zwischenact'; he subsequently was an editorial writer and correspondent for several other newspapers. His newspaper writings were collected and furnished the material for his earlier books, including 'Pariser Studien und Bilder' (1878); 'Seifenblasen' (1879); 'Vom Kreml zur Alhambra' (1880); 'Paris unter der dritten Republik' (1881), which are mostly criticisms of political and social conditions. In 1883 he published 'Die konventionellen Lügen der Kulturmenschheit' (English translation, 'Conventional Lies of Society'), in which he shows what he believes to be the essential falsity of some of the social, ethical, and religious standards of modern civilization; and in 1892 published 'Entartung,' translated into English under the title 'Degeneration.' This is his best known work and provoked much criticism; in it he maintains that the civilization of the present, the new inventions, and the growth of great cities have resulted in the degeneration of man, especially of the higher classes; that this degeneration is seen particularly in the lowered, and often depraved, standard of literature, art, and music; and that the authors and artists of the day whose work is in accordance with these standards, are themselves mental and moral degenerates. His other works include: 'Paradoxie' (1885; in English, 'Paradoxes'); 'Die Krankheit des Jahrhunderts' (1887; in English, 'The Malady of the Century'); 'Seelen Analysen' (1892); 'Die Drohnenschlacht' (1897); the novel, 'Gefühlsskizzen' (1891; in English, 'A Comedy of Sentiment'); and the dramas, 'Der Krieg der Millionen' (1832); 'Das Recht zu lieben' (1893); 'Die Kugel' (1894); and 'Dr. Kuhn' (1898). Dr. Nordau is a Jew and has been one of the prominent leaders of the Zionist movement. An attempt to assassinate him was made in the latter part of 1903.

**Nordenfelt**, nôr'dên-fêlt, **Torsten Vilhelm**, Swedish inventor: b. 1842. He received a thorough technical training; from 1862 to 1866 was engaged in promoting the sale of Swedish iron in London; and early in the eighties established in Sweden, England, and France factories for the production of ammunition, machine guns, torpedoes, and submarine torpedo boats. Soon after-

## NORDENFELT MACHINE GUN — NORDHOFF

ward with Hiram S. Maxim (q.v.) he formed the Maxim-Nordenfellt Company. Oscar II. of Sweden named him royal chamberlain in 1885. Nordenfellt's best known invention is a machine gun, intended as a defense against torpedo boats, made with from 2 to 12 barrels, from any one of which the supply of ammunition can be shut off without interfering with the other barrels.

**Nordenfellt Machine Gun.** See **ORDNANCE**.

**Nordenskiöld, nôr'dên-shêld, Adolf Erik, BARON,** Swedish Arctic explorer: b. Helsingfors 18 Nov. 1832; d. Dalby, Sweden, 12 Aug. 1901. He was educated in Finland at the University of Helsingfors by his father, Nils Gustav Nordenskiöld (1792-1865), a mineralogist, with whom he explored parts of the Urals. He was graduated in 1857, and in 1858 became superintendent of the mineralogical department of the Swedish Royal Museum in Stockholm, having been forced to leave Finland by the Russian authorities, who took umbrage at his political views. In all subsequent Arctic expeditions sent out by the Swedish government he took part, accompanying Torrell in 1858 and 1861, and being leader himself in 1864 and in 1868, when he attained to 81° 42', the farthest north at that time reached on board ship. Oscar Dickson, a wealthy gentleman of Göteborg, who had contributed to previous exploration funds, made it possible for Nordenskiöld to explore Greenland in 1870, a preliminary expedition, which, however, made important discoveries of algæ and meteorites and penetrated the island farther than had ever been done before. In 1872, after serving two years in the Swedish lower house of parliament, where he allied himself with the Liberal party, Nordenskiöld set out on the fifth Swedish expedition, which wintered in Mossel Bay, whence with a few comrades he pushed north in the spring of 1873 on sledges. In 1875 and 1876 he led the expeditions sent out by Dickson across the Kara Sea and up the Yenesei River, a journey repeated in 1876. These were mere preparations for his great exploit in 1878-9, when he circumnavigated the Eurasian continent; leaving Karlskrona 22 June 1878; wintering in the ice near Bering Strait, after a successful northeast passage, thus accomplishing a project planned three centuries before; reaching Yokohama 2 Sept. 1879, and returning to Europe by the Suez Canal. In 1883 he again explored Greenland from the west coast, beating his previous record of the farthest inland. The remaining years of his life were spent in the study of early cartography, his publications in this field being 'Periplus, an Essay on the Early History of Charts and Sailing Directions' (1897); an edition of Marco Polo, in French with facsimile (1882); 'Bidrag til Nordens äldsta historia' (1892), in honor of the American Columbian celebration, and accompanied by the earliest maps of North America. Most of his important explorations were also described by his pen. Consult: Leslie, 'Arctic Voyages of Nordenskiöld' (1880); and the 'Life,' in Swedish, by Andersson (1901).

**Nordenskiöld, Gustav,** Swedish explorer, son of A. E. Nordenskiöld (q.v.): b. Stockholm 1868; d. Mörsill 6 June 1895. He explored Spitzbergen in 1890 and the Colorado cañons in 1891, and described the latter in a work translated by Morgan under the title 'The Cliff Dwellers of the Mesa Verde' (1893).

**Nordenskiöld, Nils Otto,** Swedish explorer and geologist, nephew of A. E. Nordenskiöld (q.v.): b. Småland 6 Dec. 1869. He was educated at Upsala, where he was graduated with a doctor's degree in 1894. In 1895-7 he accompanied the scientific expedition to Patagonia under Ohlin; in 1898 traveled through the Klondike; in 1900 was a member of the Danish expedition under Amstrup to the eastern coast of Greenland; and in October 1901 left Göteborg on the Antarctic to explore the south polar regions. His ship was sunk in Erebus and Terror Gulf in the early part of 1902, and he and his men encamped on Paulet Island, whence they were rescued by the Uruguay, a gunboat sent out by the government of Argentina.

**Norderney, nôr'dêr-nî,** Germany, one of the East Friesian Islands, three miles from the coast of Germany and belonging to the province of Hanover. It is about eight miles long and a little over one mile wide. It is treeless, covered with dunes which are from 10 to 75 feet in height. At the southwest extremity is a village which is protected from the sea by a wall, and the lighthouse in the centre of the island may be seen many miles. The island is the most important of the group on account of being a favorite sea-bathing place. Pop., permanent, about 3,878.

**Nordhausen, nôr'd'how-zên,** Germany, city in the province of Saxony, on the Zorge, 40 miles north-northwest of Erfurt. It is at the base of the Harz Mountains and the west end of the fertile "Goldene Aue," that is, "golden plain." It has 70 large distilleries of corn brandy, "Nordhäuser schnaps," tanneries, chemical works, and tobacco factories. A quaint town-hall, a Gothic cathedral, and the Church of Saint Blasius, which has two paintings by Lucas Carnach, are all of interest.

**Nordheimer, nôr'd'hîm-êr, Isaac,** American Orientalist: b. Memelsdorf, Germany, 1809; d. New York 31 Nov. 1842. His fondness for learning was early displayed and his maturer education was at Würzburg and Munich, where he gained his degree in 1834. In 1835 he came to New York and was instructor in sacred literature in Union Seminary (1838-42), and professor of Hebrew at the New York University (1836-42). His 'Hebrew Grammar,' an elaborate work in two volumes, appeared in its 2d edition in 1842. His other works include: 'A Grammatical Analysis of Scripture or a Chrestomathy' (1838); 'A Philosophy of Ecclesiastes' (Biblical Repository July 1838). He left in MSS. valuable grammars of Syriac and Arabic.

**Nordhoff, nôr'd'hôf, Charles,** American journalist and author: b. Erwitte, Westphalia, Prussia, 31 Aug. 1830; d. San Francisco, Cal., 15 July 1901. He came to the United States with his parents in 1835, and in 1843 was apprenticed to a printer in Cincinnati. In 1844 he joined the United States navy and served three years, in which time he made a voyage round the world. He continued to go to sea in merchant, whaling, and fishing vessels until 1853, and was then employed in newspaper offices, first at Philadelphia, and later at Indianapolis. From 1857 to 1861 he was engaged in editorial work in a New York publishing house; and from 1861-71 was on the staff of the New York *Evening Post*;



## NORDICA — NORFOLK

and also contributed to the New York *Tribune*. From 1871 to 1873 he traveled in California and Hawaii, and in 1874 became Washington correspondent for the New York *Herald*. He has described his experiences as a sailor in his 'Man-of-War Life' (1855); 'The Merchant Vessel' (1855); 'Whaling and Fishing' (1856); and 'Nine Years a Sailor' (1857). His sociological and political writings include: 'Secession is Rebellion' (1860); 'The Freedmen of the South Carolina Sea Islands' (1863); 'America for the Free Working Men' (1865); 'Politics for Young Americans' (1875); and 'The Communitistic Societies of the United States'; this last is a description and history of different communistic colonies, and is a valuable contribution to descriptive sociology. His other works are: 'Stories from the Island World' (1857); 'Cape Cod and All Along Shore' (1868); 'California for Health, Pleasure, and Residence' (1872); 'Northern California, Oregon, and the Sandwich Islands' (1874); 'The Cotton States in the Spring and Summer of 1875' (1876); 'God and the Future Life' (1881); and 'Peninsular California' (1888).

**Nordica**, nōr'dī-ka, **Lillian**, American opera singer: b. (LILLIAN NORTON) Farmington, Maine, 1859. She studied in the Boston Conservatory and under O'Neill made her first appearance in 1876 as a concert artist, in 1878 went to Europe with Gilmore's Band, studied at Milan under Sangiovanni, and made her operatic début at Brescia in 'Traviata.' Her success was great; she was immediately engaged for the Imperial opera at Saint Petersburg, and after two years there appeared in Paris in 1882. In the same year she retired from the stage to marry Frederick A. Gower, whom she sued for divorce in 1885, but who disappeared at about the time of the suit, probably having been killed in a balloon accident. She first appeared in London in 1887, and in New York in 1895. In 1894 she played Elsa in 'Lohengrin' at the Wagner Theatre in Baireuth, and in 1896 married the Hungarian tenor, Doehme, who took the title role in 'Parsifal' at Baireuth in 1894. She obtained a divorce from him in 1904. Her repertoire is large and she is especially successful in Wagnerian opera and in 'Les Huguenots' and Aida.

**Nördlingen**, nērd'ling-ën, Germany, town in the western part of Bavaria, on the Eger River, 75 miles northwest of Munich. Its history dates back to the year 900, and some of the buildings still remaining bear evidence of an even earlier date. Two of the decisive battles of the Thirty Years' war were fought in Nördlingen; one 16 Sept. 1634, where Ferdinand, the king of the Romans, was successful, and South Germany was freed from foreign rule; and the other 13 Aug. 1645 between the Imperial forces and the French,—the French were victorious. Nördlingen has considerable manufacturing interests; linen and woolen goods, carpets, leather, agricultural implements, furniture, and toys are among the manufactures. It has schools of note and a large library.

**Nordmann, Johannes Rumpelmaier**, yō-hān'nēs room'pēl-mī-ēr nōrt'mān, Austrian writer: b. Landersdorf, Austria, 13 March 1820; d. Vienna, Austria, 20 Aug. 1887. He was an actor in early life, but after the success of his first book 'Aurelie,' a volume of poems pub-

lished in 1847, he devoted himself to travel and literature. He wrote: 'Zwei Frauen' (1850); 'Ein Wiener Bürger' (1860); 'Frühlingsnächte in Salamanca' (1880); etc.

**Nordstrand**, nōrd'strānt, Germany, an island belonging to the North Friesian group, in the North Sea; area, about 21 square miles. Prior to 1634 the area was about 210 square miles; but that year a flood swept over the island, destroying the greater part of the land and drowning over 6,000 people. Many people on the islands of the vicinity were drowned. Pop. about 3,000.

**Nore**, nōr, a river in Ireland which has its rise in the mountains in the northeastern part of Tipperary, flows northeast into Queens County, then southeast through Kilkenny, and joins the Barrow River about two miles above New Ross. It is navigable for steamers of considerable size as far as Inistoge about 20 miles from Waterford Harbor, and smaller craft to Thomastown. Kilkenny is the largest city on its banks.

**Norfolk**, nōr'fōk, **Charles Howard**, 11TH DUKE OF, English politician: b. 5 March 1746; d. London 1815. Breaking with the traditions of his family, notably his father, a Roman Catholic and author of pamphlets on penal laws against the Catholics, the son became a Protestant and a Whig; sat in Parliament 1780-4; became lord of the treasury in the Portland Cabinet in 1783; and was dismissed in 1798 from the lord-lieutenancy of the West Riding for toasting the "sovereign English people" in terms displeasing to the Crown. At his death the title passed to Bernard Edward Howard, the first Roman Catholic lord to sit in the House after the Act of Emancipation.

**Norfolk, Henry Granville Fitzalan Howard**, 14TH DUKE OF, English politician: b. 7 Nov. 1815; d. Arundel Castle, Sussex, 25 Nov. 1860. He studied at Trinity College, Cambridge; became a zealous Whig and was always an ardent Catholic. He was a member of the House of Commons from 1837 to 1852, then breaking with his party on the Ecclesiastical Bill of 1850; spent several years in Paris, where he was known as a friend of Montalembert; and in 1856, upon his father's death, entered the House of Lords, where he vigorously opposed Palmerston. He wrote various pamphlets on the Catholic question and the 'Lives of Philip Howard, Earl of Arundel, and of Anne Dacres, His Wife' (1857).

**Norfolk, Henry Howard**, 6TH DUKE OF, English nobleman, friend of Evelyn, the diarist: b. 12 July 1628; d. Arundel, Sussex, 11 Jan. 1684. He was a younger son of the 2d Earl of Arundel, lived abroad until the Restoration, and in 1667 presented the Arundel Library to the Royal Society and the famous Arundel marbles to Oxford University. He was envoy to Morocco in 1669 and succeeded his brother as duke in 1670. Consult Evelyn, 'Diary.'

**Norfolk, Henry Howard**, 7TH DUKE OF, English politician, son of the 6th Duke: b. 11 Jan. 1655; d. London 2 April 1701. He studied at Magdalen College, Oxford; became lord-lieutenant of Norfolk, Berkshire, and Surrey; and was so strong a Protestant that in spite of his personal attachment to James II., he signed the petition for the Convocation Parliament in 1688 brought over the eastern counties to William of Orange, and was made privy councillor in 1689.

## NORFOLK

**Norfolk, Henry Fitzalan Howard, 15TH DUKE OF,** English politician: b. Carlton Terrace 27 Dec. 1847. He succeeded to the title in 1860 upon the death of his father, whom he resembles in his zeal for the Roman Catholic Church. He is president of the Catholic Union of Great Britain; acted as special envoy to the Pope in 1887; with the Unionists he opposed Gladstone's Home Rule programme; and from 1895 to 1900 was postmaster-general. He served in the South African war.

**Norfolk, John Howard, 1ST DUKE OF,** English admiral, supporter of the House of York: b. about 1430; d. Bosworth, Leicestershire, 22 Aug. 1485. He was a great-grandson of Sir William Howard, founder of the family and chief justice of common pleas under Edward I. and Edward II. He served in France, was elected to the Commons in 1455 by the interest of John Mowbray, last duke of Norfolk of that name, thus becoming allied to the House of York. He was knighted upon the accession of Edward IV., fought again in France and against the Lancastrians, and in spite of this was made a baron by Henry VI. He became a lieutenant of Richard III., who made him duke of Norfolk, earl marshal, and admiral of England in 1483; and fighting for Richard at Bosworth he was killed. The title of Duke of Norfolk revived for him had been held by the Mowbrays, from whom he was descended on the distaff side.

**Norfolk, Thomas Howard, 2D DUKE OF,** English soldier and statesman, son of John Howard, 1st Duke of Norfolk (q.v.): b. 1443; d. Framlingham, Suffolk, 21 May 1524. Like his father he fought for Edward IV. at Barnet (1471) and for Richard III. at Bosworth (1485), but in 1514 recovered his attainted title, becoming one of the most trusted generals of the day. He put down the Yorkshire rising of 1489, defeated the Scotch at Flodden (1513), and on the "Evil May Day" of 1517 repressed with terrible severity a riot in London. His entire subservience to the Crown was shown by his concurring in the condemnation of Buckingham for treason, after acting as lord high steward of the court which tried his friend.

**Norfolk, Thomas Howard, 3D DUKE OF,** English statesman, son of 2d Duke (q.v.): b. 1473; d. Kenninghall, Norfolk, 25 Aug. 1554. He married Anne, daughter of Edward IV.; served in the navy and in 1513 under his father at Flodden. He opposed the policy of Wolsey and angered the king against him; was less successful in his opposition to Thomas Cromwell; and in 1546 with his son Henry, Earl of Surrey, was accused of high treason. He was condemned to death and rescued only by the death of Henry VIII. He remained in the Tower during Edward VI.'s reign; but was restored to favor under Mary; and in his 81st year showed equal bravery and rashness in leading the forces against Wyatt. His grandson THOMAS HOWARD, 4th Duke of Norfolk, son of the Earl of Surrey: b. 1536; d. Tower Hill 2 June 1572; became duke in 1554; gave largely to the foundation of Magdalene College, Cambridge; was sent to Scotland in 1568 to inquire into affairs there; attempted to marry Mary, Queen of Scots; and as head of the English nobility played a prominent part in the Ridolfi plot in her behalf. He was tried for treason and executed.

**Norfolk, Thomas Mowbray, 1ST DUKE OF,** (of the first creation), English statesman: b. about 1366; d. Venice 1399. He was elected to Parliament in 1383; served in Scotland in the following year; joined in the prosecution of the favorites of Richard II. by the Merciless Parliament; but was soon reconciled to the king and assisted him greatly in his tyrannical policy toward the nobles. Norfolk arrested Gloucester, Arundel and Warwick, and when bidden to produce Gloucester for trial he said that the prisoner was dead, and very possibly he was responsible for Gloucester's death. He was made Duke of Norfolk in the same year, 1397; but in 1398 was accused of treason and banished from England.

**Norfolk, Va.,** city, port of entry, and United States naval station in Norfolk County; the second largest city of Virginia; on the Elizabeth River, which is an arm of the Chesapeake Bay, the Albemarle and Chesapeake Canal, and Dismal Swamp Canal. It is 116 miles by water and 90 miles in a direct line southeast of Richmond, on the Atlantic Coast Line railroad, the Seaboard A. L., the Chesapeake & O., the Norfolk & W., the Norfolk & S., the Southern and the New York, P. & N. R.R.'s. Portsmouth and Berkley, which are practically a part of Norfolk, are just across the Elizabeth River.

*Topography and Climate.*—The city covers an area of about four square miles and is laid out on rather level ground. The climate is genial, being tempered by the Gulf Stream, which runs nearer the shore off Capes Henry and Hatteras than at any other point along the Atlantic coast.

*Public Buildings.*—Among the prominent buildings here are Saint Paul's Church, built in 1737; Public Library (12,000 volumes), Carnegie Library, City Hall, Custom House, Saint Vincent's Hospital, Protestant Hospital, Post-office, Norfolk Mission College; upward of 30 churches, an academy for young ladies, an institution for colored students, and there is a beautiful public park embracing 95 acres.

*Government.*—Under the revised and amended charter of 1884, Norfolk is governed by a mayor, elected every four years, and a city council, with two branches, select and common. The administrative officers elected by popular vote include city treasurer, attorney, street inspector, revenue commissioner, collector of taxes. The school trustees are elected by the city councils. The cost of maintenance for the city departments amounts to \$600,000 annually; the principal items being interest on debt, \$175,000; fire department, \$50,000; schools, \$60,000; street, sewer and drain department, \$90,000; and police department, \$73,000. The municipal waterworks were built in 1872 and cost \$1,236,000. There are 60 miles of street mains in the system. In 1903 the assessed valuation of the city was \$30,487,200.

*The Naval Station.*—Norfolk is 8 miles distant from Hampton Roads and 17 miles from the Atlantic Ocean. Norfolk and Portsmouth, on the opposite side of the Elizabeth River, constitute the largest naval station in the United States. The Norfolk navy yard is located at Portsmouth. The coaling station here handles over 2,500,000 tons annually. The harbor is commodious, accessible for the largest warships

## NORFOLK ISLAND—NORMAL COLLEGE OF NEW YORK

and has a main channel 30 feet deep. The defenses include Fortress Monroe.

**Customs.**—There is a United States Customs District here, embracing both Norfolk and Portsmouth. The foreign trade in 1900 was represented by imports valued at \$318,401 and by exports to the amount of \$11,505,000; in 1901 the imports were \$594,000; exports \$10,308,000; 1902 imports \$501,501; exports \$7,119,243; 1903, exports \$9,297,482; imports 1903, \$516,603.

**Trade and Commerce.**—Norfolk is the terminus of many steamship lines, transatlantic and coastwise, and has a large boat traffic with the interior by canal. It is already an important commercial centre and is growing rapidly in this direction. The commerce of the port includes lumber, coal, grain, cotton, peanuts, oysters, fruit and vegetables. It is the leading peanut market of the world, is the fourth cotton port of the United States, with a business of 600,000 bales annually; an oyster trade of \$2,500,000 and a trucking business of \$6,000,000. Norfolk has 2 national banks, 6 state banks, chamber of commerce, board of trade, cotton exchange, real estate exchange. The Union stock yard here has an annual business of \$2,500,000.

**Manufactures.**—Many large manufactories were established here in 1901, 1902 and 1903. In 1909 the manufactures represented capital to the amount of \$10,744,000, with a production valued at \$10,341,000. The industries include cotton knitting-mills, cotton compress-mills, fertilizer factories, ship yards, tobacco and cigar factories, iron foundries, machine shops, steel works, carriage and wagon shops, lumber mills, silk mills, barrel, box and crate factories, brick yards, breweries, bottling works, grain elevators, electric supply works and numerous minor concerns. There are gas and electric light plants here, an electric traction system and daily and weekly newspapers.

**History.**—The town of Norfolk was first settled in 1680. It was bombarded and nearly destroyed by the British under Lord Dunmore, 1 Jan. 1776. In 1736 the town was incorporated as a borough and was chartered as a city in 1845. The city suffered severely in 1855 from an epidemic of yellow fever. During the Civil War, in April 1861, General Taliaferro entered the city with a large body of Virginia troops. In May 1862, the Federal army took possession of the city and during the interval from April 1861 to May 1862 the city was the chief Confederate naval station.

**Population.**—In 1860 Norfolk had a population of 14,620; (1880) 21,966; (1890) 34,871; (1900) 46,624. Census of 1910, 67,452. The three cities of Norfolk, Portsmouth and Berkley, which practically form one municipality, have an aggregate population, within a radius of three miles, of 118,000.

**Bibliography.**—Burton, 'History of Norfolk' (1877); Forrest, 'Historical and Descriptive Sketches of Norfolk and Vicinity' (1853); Lamb, 'Our Twin Cities of the 19th Century' (1888).

W. H. LUMSDEN,  
*Secretary Chamber of Commerce, Norfolk, Va.*

**Norfolk Island,** in the Pacific Ocean, 400 miles northwest of North Cape, New Zealand, nearly midway between that colony and New Caledonia, and about 800 miles east of Australia,

is six miles long, and has an area of 8,528 acres, rising in Mount Pitt to a height of over 1,000 feet. The climate is healthful, and the soil fertile and well watered; distinctive features of its flora are the Norfolk Island pine, growing to a height of 200 feet, and the Norfolk Island cabbage, a dwarf pine. Norfolk Island was discovered by Cook in 1774. Between 1788 and 1805, and again between 1826 and 1855, it was a penal settlement for convicts sent from New South Wales. In 1856 many of the inhabitants of Pitcairn Island (q.v.) were transferred hither by the British government. The people govern themselves, under the superintendence of the government of New South Wales, but are indolent, and, owing to intermarriage, a decaying race; they fish, farm, and supply provisions to passing vessels.

**Norfolk Island Pine.** See ARAUCARIA.

**Norfolk Spaniel.** See SPANIEL.

**No'ria,** a hydraulic machine used in Spain, Syria, Egypt, and other countries for raising water. It consists of a water-wheel with revolving buckets or earthen pitchers, but its modes of construction and operation are various. As used in Egypt it is known as the sakieh. These machines are generally worked by animal power, though in some countries they are driven by the current of a stream.

**Norjac, Jules,** zhül nō-rē-āk, pseudonym of Claude Antoine Jules Cayron: b. Limoges, France, 1827; d. Paris, France, 1 Oct. 1882. His novels have won a high reputation and among the most widely known are: 'The Countess of Bruges' (1878); 'The Chevalier de Cerny' (1879); etc.

**Normal, nōr'mal, Ill.,** city in McLean County; at the junction of the Chicago & A. and the Illinois Central R.R.'s; two miles northeast of Bloomington and about 60 miles northeast of Springfield. It was settled about 1840, incorporated in 1850, and chartered as a city in 1867. It is in a productive agricultural region in which considerable attention is given to the cultivation of fruit and nursery stock and to the raising of Norman and French draft horses. It has canning factories, novelty works, and a large trade in farm products, nursery stock, and horses. It is the seat of the Illinois State Normal University and the Illinois Soldiers' Orphans' Home. It has five churches, graded schools, and a library. The bank has a capital of \$100,000. The government is administered under special charter and is vested in a president and a council of five members, all elected annually. Population of the city is about 4,000.

B. H. McCANN,  
*Editor 'The Advocate.'*

**Normal College of the City of New York,** founded in 1869, for the training of teachers. The first attempt in New York city to provide public means for teachers to procure professional training was in 1856, when a daily normal school was established, which remained in existence only three years. This was followed by the Saturday Normal School, which proved a source of inspiration to the teachers, and made them strong advocates for more thorough professional work. In 1869 the Normal and High School for young women was established by the Board of Education; in 1870 the name was

## NORMAL SCHOOL—NORMAN FRENCH

changed to Normal College. Graduates of grammar grades were then admitted and the course was for three years. The first president was Thomas Hunter; the present head of the school is George S. Davis. The board of trustees consists of the president of the college and the Board of Education of the city public schools. The entrance requirements and the course of study have been raised, and now the institution has a professional course of six years and a collegiate course of seven years, with power to grant degrees. It has a model kindergarten and a model elementary school, an excellent library and five well equipped laboratories. From 1870 to 1910 there have been about 12,000 graduates. Of this number 1,870 were graduated between 1870 and 1880; 2,517 between 1880 and 1890; and 3,379 between 1890 and 1900. A large number of the teachers in New York city are graduates of this college.

**Normal School, Manila**, established in 1901 by the superintendent of public education for the Philippines. From 10 April to 10 May 1901, a preliminary term of school was conducted under the direction of the superintendent of schools for the city of Manila. Arrangements were made to secure favorable rates of transportation for teachers distant from Manila, and students came from all parts of the archipelago. There were in attendance 600 students, 10 per cent of whom spoke English. Considerable attention was given to subject matter. The average daily attendance was 98 per cent. Many of the pupils remained as regular attendants at the normal school; and the work was most satisfactory during 1901 and 1902, although subject matter was given much more attention than methods. A practice school, well equipped, is one of the strong features. In 1903 there was a large class sufficiently advanced in English to begin regular professional work. The method department was placed in charge of Gertrude Robinson, a teacher from the Indiana State Normal at Terre Haute. The classification in the practice school is first based almost wholly upon ability to speak, read, and write English. The number enrolled in the regular normal department up to 1 Jan. 1902 was 310. The number of provinces represented was 24.

In conjunction with the Manila Normal School there are five tributary normal schools: at Vigan, province of Ilocos Sur; Nueva Cáceres, province of Camarines Sur; Iloilo, province of Panay; Cebú, province of Cebú; and Zamboanga, province of Mindanao. The pupils spend three years in the provincial school and then one year of final training in the Manila school.

In the capital of each province, a normal school is held during the long vacation; attendance is required of all the native teachers. The division superintendent in each district has charge of the vacation normal school held in his district. This vacation normal school must continue four weeks. The normal school at Manila is the head centre for all the public method schools of the archipelago.

**Normal Schools.** See **TEACHERS, PROFESSIONAL TRAINING OF.**

**Norman**, nôr'man, Henry, English traveler and author: b. Leicester, England, 19 Sept. 1858. He was graduated from Harvard in 1881

and later studied at Leipsic. In 1882 he began the public agitation for the preservation of Niagara Falls, which resulted in the purchase of land on both sides of the Falls by the State of New York and the Dominion of Canada for use as a public park. He was for several years on the editorial staff of the *Pall Mall Gazette*; and in 1895 became assistant editor of the London *Daily Chronicle*, resigning that position in 1899; he has also been London correspondent of the *New York Times* and *Chicago Tribune*. He has traveled widely in the United States and Canada, and also in Japan, Russia, Siberia, Central Asia, Korea, China, Siam, the Malay Peninsula, Egypt and the Balkans. In 1902 he founded the 'World's Work,' an illustrated monthly of which he has since been editor. In 1900 he was elected to the British Parliament from South Wolverhampton. He has written 'An Account of the Harvard Greek Play' (1881); 'The Preservation of Niagara Falls' (1882); 'The Real Japan' (1892); 'The Peoples and Politics of the Far East' (1895); 'The Near East' (1899); 'All the Russias' (1902); and 'Delhi' (1902).

**Norman**, Okla., city, county-seat of Cleveland County; on the Atchison, T. & S. F. railroad; about 48 miles south of Guthrie and 30 miles south of Oklahoma. It is in an agricultural region in which the cultivation of wheat and cotton, and cattle-raising are the chief occupations. The principal manufactures are flour, cottonseed-oil, and ice. It has considerable trade in wheat, flour, cotton, cottonseed-oil, and live-stock. It is the seat of the University of Oklahoma (q.v.) and it has the Territorial Insane Asylum. There are 11 churches and two public schools. The two banks have a combined capital of \$100,000. The government is vested in a mayor and a board of aldermen of eight members. Pop. 3,100.

W. M. CARR,  
Editor, 'Democrat Topics.'

**Norman Architecture.** See **ARCHITECTURE.**

**Norman Conquest**, in English history, the successful attempt made by William of Normandy in 1066 to secure the English crown from his rival Harold, son of Earl Godwin. It was no real conquest of the land and people by an alien race, but rather resembled in its chief characteristics the accession of William of Orange to the throne in 1688. Any immediate evil effects were more than counterbalanced by the advantages which it conferred on England, such as the better organization and greater mastery of law of the Normans; the bringing of England more into touch with European politics, and the consequent beginning of her ever-widening foreign relations; the repression of internecine strife and the greater security of life and property; the great impetus given to architecture and to many of the industrial arts; and finally its great influence on the development of the old English language into modern English. See **ENGLAND, History.**

**Norman French**, the language spoken by the Normans at the time of the Conquest. It continued to be the legal language of England till the reign of Edward III., and certain phrases are still employed on particular state occasions. It exercised a considerable influence on the Anglo-Saxon, and is still spoken among the

## NORMAN LAW — NORMANS

native population of the Channel Islands (q.v.), the remnant of the Norman possessions belonging to Great Britain. See **NORMANDY**.

**Norman Law.** See **LAW**; **NORMANDY**.

**Normanby**, nôr'man-bî, **Constantine Henry Phipps**, 1st MARQUIS OF, English statesman: b. England 15 May 1797; d. South Kensington, England, 28 July 1863. He was educated at Trinity College, Cambridge and in 1818 entered Parliament, sitting for Scarborough. In 1832 he was appointed captain-general and governor of Jamaica and in 1835 was made lord-lieutenant of Ireland, where he was extremely popular. He was secretary of war and of the colonies in 1839 and later was transferred to the home secretaryship which he occupied until 1841. He wrote: 'The English in Italy' (1825); 'A Year of Revolution' (1857); 'Vindication of the Duke of Modena' (1861); and several novels, one of which was 'The Contrast' (1832).

**Normand**, nôr'mand, **Henrietta Rae**, English painter: b. London 30 Dec. 1859, daughter of T. B. Rae; married Ernest Normand, painter, 1884. She was educated in London art schools, and was awarded a medal at the Paris and Chicago Universal Expositions. Since 1880, when she first exhibited at the Royal Academy, she has been represented there every season. Some of her most important pictures are 'Ariadne' (1885); 'A Naiad' (1886); 'Eurydice' (1880); 'Death of Procris' (1889); 'Ophelia' (1890); 'Apollo and Daphne' (1895); 'Diana and Callisto' (1899); 'Sir Richard Whittington and his Charities,' a fresco for the Royal Exchange (1900).

**Normand**, Jacques Etienne, zhâk ä-tê-ên nôr'mân, French communist: b. Abbeville, France 1809; d. San Antonio, Texas, 1867. He was a Saint Simonist, and during the revolution of 1848 in France, petitioned the legislature for permission to establish a communistic colony; he was banished from France when Louis Napoleon became president, and came to the United States. Buying considerable land near San Antonio, Texas, he established a communistic colony called Réunion, which prospered for a time, but which was finally suppressed by the Texas legislature. While trying to establish another colony, he was arrested and imprisoned. He wrote 'Principes de Socialisme' (1846); 'Théorie de la Commune Naturelle' (1855); 'Théorie de la Republique Communiste Universelle' (1860).

**Normandy**, nôr'man-dî, France, an ancient province bordering on the English Channel, now divided into the departments of Seine-Inférieure, Eure, Orne, Calvados, and Manche. It is a fertile region, with well-cultivated fields and fruitful orchards, and the people are intelligent and industrious, ranking among the best and most energetic of French provincials. Under the Romans this portion of the country formed part of *Gallia Lugdunensis Secunda*; after the Franks' invasion it made a constituent part of the kingdom of Neustria, and was given by Charles the Bald to the Duke of Paris. From the middle of the 9th century its coasts were harried by the vikings or Northmen (see **NORMANS**), who early in the 10th century established themselves in such force along the Seine that Charles, king of the Western Kingdom, was glad to arrange a treaty with their leader

Rolf (Rollo, Rou) at Clair-sur-Epte in 912, practically ceding the region which henceforth was known as Normandy. Its capital was Rouen, and it comprised Upper Normandy, with the towns of Dieppe, Evreux, Harfleur, Havre, Honfleur, Lisieux, Rouen, and Yvetot, and Lower Normandy with Caen the chief town, Alençon, Auranches, Bayeux, Cherbourg, Contances, Falaise, Granville, and Saint Lô. Rollo's most distinguished successor was William I., Duke of Normandy, who invaded England in 1066, and established a Norman dynasty, thereby uniting Normandy with the latter country. Philip Augustus conquered Normandy in 1204, the French holding it till 1417, when it was recovered by the English, who held it till 1450, when it was finally wrested from them by Charles VII. The Channel Islands (q.v.) are a remnant of the Norman possessions still belonging to the descendants of the Norman kings of England, where down to the present day the law administered in the royal courts is virtually the *Grand Coutumier de Normandie*, or the old customary law of Normandy. One feature survives in the Cry of Haro. This ancient customary law of Normandy seems to have been collected in writing on three separate occasions. The earliest collection was apparently written down by private persons in 1200 and about 1220, and had no official character; the third collection (1585) is a revised edition of the second, the *Grand Coutumier*, completed early in the 14th century. Consult: Freeman, 'Norman Conquest' (1877); Palgrave, 'History of Normandy' (1878); Spence, 'Dreamland in History' (1890).

**Nor'mans**, or **Northmen**, a general name given the people of ancient Scandinavia, or Norway, Sweden, and Denmark. This name was given to them in the Netherlands, in Germany, and France; in Great Britain they were called Danes. They were fierce and warlike tribes, who made piratical expeditions to all parts of the European seas, plundering by land and by sea, and often overrunning large tracts of country, in which they practised every enormity. "They had scarcely any inducements," says Mackintosh, the English historian, "to spare countries which they visited only to plunder, and where they did not hope to dwell; they were less than others liable to retaliation; and they had neither kindred, nor family, nor home. They were, perhaps, the only barbarians who applied their highest title of magistracy to denote the leaders of piratical squadrons, whom they termed *vikingr* or *sea-kings*. Not contented with their native and habitual ferocity, some of them sought to surpass their companions by working themselves into horrible and temporary insanity." *Vikingr* does not, however, mean sea-kings, but is derived from *vik*, a bay or creek. The poverty of their country compelled them to adopt this means of subsistence, and their religion inspired them with a love for daring enterprises, since it taught them that warriors fallen in battle were admitted to Valhalla, the northern paradise.

In 795 some Norwegians established themselves in the Farøe Isles and in Orkney; toward the middle of the 9th century they founded the governments of Novgorod and of Kiev, in Russia; and after the discovery of Iceland certain powerful Norwegian families, taking refuge from the

persecutions of Harold, king of Denmark, settled in that island. The Northmen began their piratical excursions in the first part of the 9th century, and soon covered the sea with their boats, and ravaged the coasts of England, Germany, Friesland, Flanders, and France. Under the feeble reigns of Charles the Bald and Charles the Fat they ascended the rivers to the very heart of France, and plundered Paris itself. It became necessary to purchase their retreat with gold. Their incursions into France were afterward renewed, and Charles the Simple was obliged (912) to cede to them a part of Neustria, which was afterward called, from them, *Normandy* (q.v.), and to give his daughter in marriage to Rollo, their chief. Rollo embraced the Christian religion, was baptized under the name of Robert, and became the first Duke of Normandy, and a vassal of the King of France. His followers received the religion of their leader, and abandoned their roving and piratical habits; though they still retained, as also did their descendants for a long time, marks of their Scandinavian origin, and that warlike ardor which had rendered them so terrible to those against whom they directed their attacks. Great Britain was, for about two centuries, desolated by the Danes, as the Northmen were there called. Egbert, in the beginning of the 9th century, had no sooner made some approaches toward a regular government, and the establishment of tranquillity, than the "Scandinavian heathens," as the Saxons termed them, made their appearance. Alfred (871-901) finally delivered the country from the invaders, after they had subdued the whole land except the "isle of the nobles," into which the king had retreated with a few nobles. But the relief was only temporary: they returned, under his successors, in greater force, obtained possession of the northern and eastern part of the country, and in the beginning of the 11th century three Scandinavian princes (Canute, Harold, and Hardicanute) ruled over all England for the space of about 25 years. The Saxon line was then restored; but in 1066 William, duke of Normandy, obtained the English throne. This conquest, as it is commonly called, had a most important influence on the Saxon manners, language, and constitution, which had hitherto escaped with little change, and is therefore one of the most important epochs in English history. In the year 1000, according to the Saga narratives, Leif, son of Eric the Red, leaving Greenland, which had been discovered and settled by his father, a Norwegian, proceeded southward in a ship, accompanied by 35 men, and discovered the American coast, to which he gave the name of Vinland. In 1007 a rich Greenlander, with a following of 60, emigrated to Vinland, and there planted a colony, which seems to have thriven, but after a time we hear nothing more about it. The Normans also established a new kingdom in Naples in 1016. The foreign expeditions of the Northmen gradually diminished their numbers and strength at home, and rendered them less formidable.

Consult: Depping, 'Histoire des Expéditions maritimes des Normands et de leurs Etablissements en France au Xme Siècle' (1826); Du Chailu, 'The Viking Age' (1890); Freeman, 'History of the Norman Conquest of England' (1877); Keary, 'Vikings in Western Christendom' (1891).

**Norns, nórnz**, in Scandinavian mythology, the three Fates, representing the past, the present, and the future, whose decrees were irrevocable. They were represented as three young women, named respectively Urd, Verdandi, and Skuld. They sit by the well of Urd, under the world-tree Ygdrasil in Asgard, and there determine the fate of both gods and men. Besides these three there are many inferior norns, both good and bad, answering to the genii of classical mythology; to such are attributable the unequal destinies of men in the world. Women who possessed the power of prediction or magic also bore this name.

**Norridgewock Indians**, an American tribe of the Algonquin family. They formerly lived along the Kennebec River in Maine, and were frequently called Kennebec Indians. They were patrons of the French missionaries and were regarded as dangerous enemies of the English colonists. The latter sent an expedition against the Norridgewocks in 1724, and the tribe was practically annihilated.

**Norris, nór'is, Edwin**, English linguist: b. Taunton, Somerset, England, 24 Oct. 1795; d. Brompton, England, 10 Dec. 1872. His early youth was spent in tutoring, and in 1818-37 he was a clerk with the East India Company. In 1837 he became assistant secretary of the Royal Asiatic Society and in 1859 its secretary. His time was principally devoted to the study of the Semitic languages and the Celtic dialect, and he was an authority on cuneiform writing. His greatest work is his 'Assyrian Dictionary' (1868-72).

**Norris, Frank**, American novelist and journalist: b. Chicago 1870; d. San Francisco 25 Oct. 1902. He studied at the University of California and at Harvard, after three years as an art student in Paris; was war correspondent of the San Francisco *Chronicle* in South Africa in 1895-6; edited the San Francisco 'Wave' 1896-7; wrote articles from Cuba for 'McClure's' in 1898; and was the author of several virile realistic novels: 'McTeague' (1899), 'Moran of the Lady Letty,' a romantic story (1900); 'The Octopus,' a story of wheat raising and transportation (1901), and 'The Pit,' dealing with wheat exchange and gambling. The two last named stories are epical and Zolaesque in manner, and were to have been concluded by 'The Wolf,' a story of European famine.

**Norris, Henry**, English courtier: d. London, England, 17 May 1536. He became a member of the court in early youth and was a favorite of Henry VIII., holding under him many important offices. He was instrumental in accomplishing the downfall of Wolsey and was a friend of Anne Boleyn while she was gaining her foothold at court. Later he was suspected by the king of an undue intimacy with Anne and though doubtless innocent was imprisoned in the Tower and executed.

**Norris, Mary Harriott**, American novelist: b. Boonton, N. J., 16 March 1848. She was graduated from Vassar College in 1870, was principal of a private school in New York 1880-96, and dean of the woman's department of Northwestern University, Evanston, Ill., 1898-9. Among her published books are: 'A Damsel of the 18th Century' (1889); 'The Gray House of



the Quarries' (1898); 'The Grapes of Wrath' (1901).

**Norris, William Edward**, English novelist: b. London, England, 18 Nov. 1847. He was the son of a former chief justice of Ceylon; was educated at Eton, and admitted to the bar in 1874, but never practised. His first novel, 'Heaps of Money,' appeared in 1877, and was successful. It was succeeded by 'Mademoiselle de Mersac' (1879); 'Matrimony' (1881); 'No New Thing' (1882); 'His Grace' (1892); 'A Deplorable Affair' (1893); 'A Victim of Good Luck'; 'Billy Bellow'; 'A Dancer in Yellow' (1896); 'Clarissa Furiosa' (1898); 'Marietta's Marriage'; 'The Widower' (1897); 'Giles Ingilby' (1899); 'An Octave' (1900); 'Lord Leonard the Luckless' (1903); 'Barham of Bel-tana,' 'An Embarrassing Orphan' (1904); all of which have enjoyed popularity. He has shown not a little skill in character drawing and his dialogue is entertaining and natural.

**Norristown**, Pa., borough, county-seat of Montgomery County; on the Schuylkill River, the Schuylkill Canal, and on the Philadelphia & R. and the Pennsylvania R.R.'s; about 15 miles northwest of Philadelphia. It was settled about 1688 by a colony from Wales, laid out in 1785, and incorporated as a borough in 1812. It was named in honor of Isaac Norris, who owned a large tract of land in what is now Montgomery County. It is in an agricultural and mining section of the State, and has extensive manufacturing interests. The chief manufactures are knitting machines, hosiery, men's underwear, glass, iron, wire, screws, machine-shop products, agricultural implements, iron and wood furniture. It has considerable trade in manufactured articles and farm products. Some of the prominent buildings are the county court-house, city buildings, Masonic Temple, and the county prison. It has a State Hospital for the Insane, Charity Hospital, Saint Joseph's Protectory (R.C.) for girls, Friend's Home, and the Agnes Stinson Home for Aged Ladies. The educational institutions are a high school, public and parish schools, the Montgomery Historical Society, and the McCann library. The tomb of Winfield Scott Hancock (q.v.) is here in Montgomery Cemetery, also a memorial shaft to John F. Hart-ranft. Valley Forge (q.v.) is only six miles west by north, and many other places of historic and scenic interest are in the vicinity. The government is vested in a burgess, who holds office three years, and a council. The assessed value of the city's real and personal property in 1910 was \$12,130,995. Pop. (1910) 27,875.

**Norrköping**, nôr'hé-pîng, Sweden, seaport, on the southeast coast, on the Bravik River; about 80 miles southwest of Stockholm. It was founded in 1384, but it has several times been destroyed by fire. The Motala, a rapid river, flows through the city and furnishes extensive water-power which is used for manufacturing. In 1902 there were over 180 manufacturing establishments, whose annual products were valued at over \$10,000,000. It is an important commercial city, and has an extensive trade in its manufactures of cotton and woollen goods, carpets, paper, etc., and in the imports which are re-shipped at Norrköping for the interior. Pop. about 47,000.

**Norrländ**, nôr'länd, Sweden, the largest of the three historical divisions of Sweden; in the northern part; area, 80,785 square miles. It has a cold climate, well-wooded in the south, scanty vegetation in the north. The towns and villages are chiefly in the southern part; but few settlements are in the northern part. Pop. about 860,000. See SWEDEN.

**Norse**, the language of Scandinavia, especially in its earlier forms. Old Norse is represented by the classical Icelandic, and still with wonderful purity by modern Icelandic. See ICELAND; SCANDINAVIA.

**Norse Mythology**. See MYTHOLOGY.

**Norseman**, or **Northmen**. See NORMANS.

**North, Christopher**, the pseudonym of one of the authors of the 'Noctes Ambrosianæ.' See WILSON, JOHN.

**North, Sir Dudley**, English financier and economist, 3d son of the 4th Lord North: b. Westminster 16 May 1641; d. Covent Garden 31 Dec. 1691. He early entered the employ of a merchant in Turkey; became treasurer of Turkey Company; returned to England in 1680; was one of the sheriffs of London in 1682 and a commissioner of customs in 1683; and retired from public life shortly after the accession of William and Mary. He was a man of great ability, one of the first Englishmen to urge the doctrine of free-trade, and the author of an important pamphlet on the 'Currency.'

**North, Francis**, BARON GUILFORD, English lord chancellor, brother of Dudley and Roger North (qq.v.): b. Kirtling, Cambridgeshire, October 1637; d. Wroxtton, Oxfordshire, 5 Sept. 1685. He was educated at Cambridge, and studied law at the Middle Temple. His rise was rapid: in 1671 he was knighted; in 1673 became attorney-general; and from 1675 to 1682 was chief justice of the court of common pleas. In 1682 he became lord chancellor, was created Baron Guilford in 1683, and died soon after assisting at the coronation of James II. His uncompromising royalism made him the object of contemporary attack and present misunderstanding, notably in Lord Campbell's 'Lives of the Lord Chancellors.' It is to an early attack of this nature, namely that in Kennett's 'Complete History' that we owe Roger North's 'Apology' for his brother, which grew into the 'Lives of the Norths.' The conflict of testimony makes his personal character problematical, but it is certain that he was a learned lawyer and a patron of literature, the arts, and the sciences.

**North, Frederick**, LORD, EARL OF GUILFORD, English statesman, George III.'s prime minister during the American Revolution: b. London 13 April 1732; d. there 5 Aug. 1792. His father was Francis, 1st Earl of Guilford. He was educated at Eton and Oxford; studied and traveled abroad for three years; and in April 1754 was elected to the House of Commons for one of his father's pocket-boroughs. From June 1759 to July 1766 he was a junior lord of the treasury; and in 1767 became chancellor of the exchequer and leader of the House of Commons upon the death of Townshend, whose measures taxing the American colonies Lord North carried through, and in this particular as in general showed himself the "King's friend" and entirely indifferent to the wishes of the people. Early in 1770 he became

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prime minister, but was none the less merely the King's tool; in March 1774 he succeeded in passing the celebrated Boston Port Bill and Massachusetts Bill; and though he seems to have seen soon after the King's policy was a mistaken one and could result only in the loss of the colonies, and although he urged in 1775 that the colonies, if they taxed themselves, should not be taxed by Parliament, he still supported the King's obstinate policy and remained in office, while his government grew steadily weaker because of the defection of men whose scruples, identical with his, carried some force with them. On 20 March 1782 he resigned, just in time to forestall a motion for the dismissal of the cabinet. In February of the next year by a dexterous coalition with his old enemy, Fox, he secured the dismissal of Shelburne, was a member of the coalition cabinet of 1783, and thereafter acted with the opposition against Pitt. The last five years of his life Lord North was blind, but still took some interest in politics, and spoke occasionally in the House of Lords, of which he became a member in 1790 upon his father's death. Personally he was clumsy, awkward, very short-sighted, with an unintelligent puffy face, expressionless eyes, and heavy lips, closely resembling George III. As prime minister he was the King's agent; indeed, he refused to be called prime minister, denying the place of any such office in the British constitution. After his coalition with Fox he broke with the Crown, however, and refused George III.'s urgent offers to make him premier in 1783. He was neither a great statesman nor a great orator, but had a gift of humor, wit, and pleasant temper. Consult: Donne, 'Correspondence of George III. with Lord North' (1867); Lecky, 'History of England' (1882-7); Lewis, 'Administrations of Great Britain' (1864).

**North, Roger**, English colonist in America; b. about 1585; d. 1652. He was the son of Sir John North, and a grandson of Roger, 2d Baron North, and in 1617 accompanied Sir Walter Raleigh to Guiana, did good service against the Spaniards on the Orinoco, and remained faithful to his commander to the last. In 1619 he applied for a patent to trade along the Amazon, and, when this was denied him because of Gondomar's influence with the King, sailed from Plymouth without leave in May 1620. Hence he was imprisoned upon his return. In 1627 he received letters-patent to found Guiana, but spent the last years of his life in England. North planted the English power in South America and was one of the most notable colonial projectors of his day.

**North, Roger**, English lawyer and historian, brother of Dudley North and Francis North (qq.v.): b. Tostock 3 Sept. 1653; d. Rougham 1 March 1734. He studied at Jesus College, Cambridge; became a barrister at the Middle Temple; rose rapidly in the practice of law, becoming attorney-general to the Queen in 1682; left political life upon the accession of William and Mary; and spent the rest of his life in retirement. He was a famous book-collector, but is best known for his 'Lives of the Norths,' an invaluable picture of the life of the period, as is his 'Autobiography.' Both these books are included in Bohn's Library (1890). His strong Tory sentiments are to be seen in the 'Examen,'

a critical inquiry into the truth of White Kennett's 'History of England.' North also wrote 'Memoires of Musick' (ed. by Rimbault in 1846).

**North, Sir Thomas**, English translator of Plutarch, son of the 1st Baron North: b. about 1535; d. about 1601. He studied at Peterhouse, Cambridge; entered Lincoln's Inn 1557; and in 1579 published his version of Plutarch's 'Lives,' actually a version from the French of Amyot. It was dedicated to Queen Elizabeth, was very popular in her day, and was the immediate source of most of Shakespeare's classical plays, notably 'Antony and Cleopatra,' 'Coriolanus,' 'Julius Cæsar,' and 'Pericles,' some of which have entire speeches taken scarcely with a change from North. North also translated Guevara's 'Libro aureo,' a Spanish adaptation of the 'Meditations of Marcus Aurelius,' thus rendering Euphuism out of Spanish into English; and a collection of Oriental fables from the Italian of Doni. Consult: Skeat, 'Shakespeare's Plutarch' (1875); and Leo, 'Four Chapters of North's Plutarch' (1878). The complete version is to be found in the 'Temple Classics,' and in a splendid reprint in the 'Tudor Translations' (1895).

**North, William**, American soldier: b. Fort Frederick, Pemaquid, Maine, 1755; d. New York 3 Jan. 1836. He entered the Revolutionary army in 1775 and served under Arnold in the Quebec expedition. In 1779 he was aide-de-camp to Baron Steuben whom he greatly assisted and who at his death bequeathed to North the bulk of his property. He was present at the surrender of Cornwallis and remained in the army after the war, rising to the rank of brigadier-general in 1798. He sat in the New York State assembly and from 1789-99 was a United States Senator. He was mustered out of service in 1800. He wrote a biography of Baron Steuben.

**North Adams**, Mass., city in Berkshire County; on the Hoosac River and on the Boston & M. and the Boston A. R.R.'s; about 50 miles northwest of Springfield. It was settled in 1765 and was part of Adams until 1878 when it was incorporated as a town, and in 1895 was chartered as a city. It includes the villages of Brayton, Greylock, Beaver, and Blackington.

It is situated in a beautiful section, amid the Berkshire Hills, at the base of Greylock, the highest peak in the State. In the western part of the city may be seen the site of old Fort Massachusetts, captured in 1746 by French and Indians under command of Vaudreuil. Hudson Brook and its natural bridge are points of interest, and near is the famous Hoosac Tunnel. The chief industrial establishments are machine-shops, cotton and woolen mills, boot and shoe factories, print goods factories, creameries, and cigar factories. The trade is chiefly in manufactures, farm and dairy products. It has a city hospital, good municipal buildings, and a number of fine church edifices. The educational institutions are a State Normal School, high schools, public and parish schools, and the North Adams Library. The charter of 1895 provides for a mayor, who holds office one year, and a council. The school committee, assessors, and library trustees are elected by popular vote. The city owns and operates the waterworks. Pop. (1900) 24,200; (1910) 22,019. Consult: Spear, 'History of North Adams': 'Berkshire Hills.'

## NORTH AMERICA

**North America.** During 1906 the earliest authentic accounts of Amundsen's voyage (1903-5) through the Northwest Passage were received, and this continent on its northern side was for the first time unmistakably defined; for, while it is true that previous exploration had shown approximately the path a ship might follow, no vessel except Amundsen's *Gjoa* has actually passed between the three oceans and the North American mainland. The track of the *Gjoa*, therefore, marks a continental boundary—a channel of open water along the mainland in the latitude of the magnetic pole and about as far from the geographic north pole as are the northern coasts of Siberia and of Norway. The channel is open probably every year for a short time during summer; but still further northward—or, let us say, between the magnetic and geographic north poles—lies the Arctic or Polar Archipelago, permanently ice-bound.

The eastern or Atlantic and western or Pacific limits of this continent are described in other articles written for the *Encyclopedia Americana*. At present we would, in passing, mention only the proximity of the numerous Atlantic ports to Europe, and of the relatively few Pacific ports to the great Asiatic countries: facts which are sometimes regarded as the main features of North America's fortunate situation. A still more favorable circumstance, or, strictly speaking, a more exceptionally favoring circumstance, will become apparent if we study somewhat attentively the southern boundary. The fact that world trade-routes cross North America is an advantage shared with some other lands; the geographic dependence of the tropical continents of the New World is, on the other hand, an unmatched fact.

We shall see that exploitation of tropical America by North Americans, and, ultimately, governmental unification of the Americas, are the results to be expected in view of the ease of communication by the inland waterways of North and South America and the comparative isolation, or remoteness from world trade-routes, of the latter.

**Southern Boundary, Transportation, and Communication.**—It has been shown in the articles dealing with Central America and the West Indian Islands that from the point of view of a geologist North America does not extend below Florida and Yucatan. Very commonly even Mexico, simply because it is a Latin-American country, is considered to lie outside of the limits of North America, and we hear the phrase "North America and Mexico." On the other hand, in a scholarly German work, entitled 'Die Bevölkerung der Erde' (issued as Supplement No. 146 to 'Petermann's Mittheilungen,' Gotha, 31 March 1904), the author, Alexander Supan, states that the area of North America is 20,817,700 square kilometers and the number of inhabitants 105,714,000, or five inhabitants to one square kilometer; and Dr. Supan's elaborate calculations are based on the assumption that North America includes the West Indies, Mexico, Central America and Panama, as well as the United States and Canada, but not Greenland. The lack of a

settled usage which appears in the foregoing examples is not hard to explain. The Gulf of Mexico and the Caribbean Sea (together forming the American Mediterranean) by which the continents appear, when one first looks at the map, to be divided and held apart, in reality hold the continents together. The American Mediterranean is part of that system of inland waterways the natural result of which has been already referred to. It will not bound: it will bind.

The present writer has on many occasions defended the view that the initiative in the movement to form closer relations between the southern and northern continents would be taken by the former. It is proper, therefore, if the position he has always maintained is at all correct, to take the Latin-American point of view (or at least for a moment to try to understand the sentiment in countries which have failed to govern themselves well) when considering this undeveloped system of waterways. In 1904 some of the leading men of the South American countries advocated the construction of a canal, described by the Bolivian minister to the United States as "Connecting the head of navigation in the southern tributaries of the Amazon with the head of navigation in the tributaries of the Rio de la Plata, thus making all-water inland communication through the heart of the continent from Venezuela on the north to Buenos Ayres on the south." Even now, before any such canal has been constructed, an electric launch, carrying a small party of explorers up the Paraná river from Buenos Ayres to Corrientes, can proceed due north from the latter Argentine town through the geographical center of South America to Manaus, on the Amazon; thence via the Negro, Cassiquiare, and Orinoco rivers to the Venezuelan coast; over the American Mediterranean to New Orleans, and so up the Mississippi and Missouri to the head of navigation, or through the Great Lakes and the St. Lawrence river to the North Atlantic; the explorers bringing to the people of the Mississippi valley specimens of the products of the little known lands in the interior of the southern continent—bringing stories of adventure, stirring accounts of experience and observation there; bringing real information for the first time home to nearly every one.

The boat, it is true, must be constructed in such a manner that it may be carried around obstructions to navigation, since a portage between the Amazon and La Plata river systems and certain rapids in the Orinoco must be anticipated. And, because there is not at present a good, unbroken inland through route for larger vessels between the Caribbean Sea and estuary of the River Plate, the achievement thus suggested may appear at first sight to be of great scientific interest rather than of great practical value.

But the Orinoco link in the chain of waterways between Canada or our Northwest and the remote Southeast of South America has a value which it would be sheer folly to overlook. Let us see what consequences flow from the fact that this long

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voyage by riverways can be made in a specially designed boat, even under existing conditions.

The systems of rivers to which the mouths of the Orinoco give access—to which the Orinoco is our gateway and near approach—are equal to four or five Mississippi. When Columbus sailed past the mouths of the Orinoco he reasoned that such a torrent proved the existence of a land mass of continental dimensions. Humboldt, more than three hundred years afterward, found that the Orinoco was joined to an affluent of the Amazon. The people of North America, preoccupied with great enterprises elsewhere, let another century go by without taking the trouble to realize that the propinquity of the Orinoco, and no other circumstance whatever, would enable them to make good their claim of predominance in every part of the Western Hemisphere; that unless their footing in Venezuela should be assured, and peaceful conditions established so that, by way of the Orinoco, a practicable north-and-south route for ordinary river steamboats could be made through the heart of the continent, the entire eastern and central regions of South America would inevitably become commercial and political dependencies of Europe.

North Americans did not know or care to know that so long as the Orinoco should remain subject to the caprice of Venezuela, and therefore an unimproved route, it would be impossible to prevent the acquisition by military Powers from across the seas of a control in all the region beyond (practically the entire continent except the coast strips west of the Andes and north of the equator), which would in effect be equal to territorial aggrandizement on an enormous scale—in other words, impossible to enforce the Monroe Doctrine as laid down by President Roosevelt in his speech at Chicago, April 2, 1903.

Perforce we restate, though very briefly, one phase of the South American problem, now that we wish to appreciate the theoretical value of the inland route between Argentina and the Gulf of St. Lawrence.

The sailing distance from Pernambuco, Brazil, to some of the coast cities of Western Europe is less than to New York. Besides, the superior facilities for transportation between Europe and the eastern and southeastern coasts of South America are steadily increasing the advantage of the Europeans. Southeastern America, for all purposes of social intercourse, including nearly every kind of intimate association which, with the lapse of time, inevitably binds nations together, can be reached much more easily from Europe than from the great centres of population in North America, if the competition is limited to vessels navigating the Atlantic Ocean. Moreover, such inducements are offered to colonists from Europe that Argentina, for example, in 1901, was re-enforced by three times as many immigrants in proportion to the total number of inhabitants as the United States. A large part of the southeastern coast receives from Europe ideas, manners, fashions, culture, immigrants. That these conditions will not be revolutionized by the completion of the

Panama Canal is shown in the article **SOUTH AMERICA**.

Now, within the coast region most subject to European influences are the mouths of four great rivers, natural avenues of internal transportation and communication piercing the continent. Only the fifth and last great river, which can be called an avenue in the same sense, the Orinoco, is comparatively near to North American ports. But the advantage for us in this case is enormous. From New York or New Orleans to the mouths of the Orinoco the sailing distance is only one-half as great as the distance between western European ports and the nearest South American rivers or important harbors.

In the vast central regions precocious streams, endowed almost from the start with the volume that elsewhere characterizes full grown rivers, run side by side, in opposite directions, approaching each other so nearly that they furnish a choice of almost continuous waterways between the far south and the north coast. As all know, the rainfall is one of the trustworthy things in the central part of South America. Wherever canalization is required, engineers will find that there is available for the purpose an inexhaustible supply of water which can be directed into the best natural channels, for the development of that mode of transportation in respect to which South America above the Tropic of Capricorn can be made to excel all other inland regions, whether of the Western Hemisphere or the Eastern. This applies equally to the upper Paraguay and Paraná, and to the country north of the Amazon, where important works are required at several points. (See **SOUTH AMERICA**.)

There is no reason to doubt that, on the completion of the labors of the engineers, river steamers of large size could follow the course of the launch above described, besides penetrating nearly all other parts of the continent.

The Argentina-Venezuela and Louisiana-St. Lawrence route in theory changes the position of North America in relation to the southeastern continent, removing the disadvantage and inferiority to which we have referred.

For the South Americans the existence of this incomparable system of inland water routes is a fact of vital importance. In it is to be found the only compensation for the remarkable absence of good harbors on the South American coasts—for there are very few points on either of those coasts, below Panama and Georgetown, that could ever be made attractive to foreign commerce, even if they were not situated at so great a distance from the world trade-routes. The conclusion seems to be quite clear: The southern boundary of North America must be drawn below the Caribbean, because there is otherwise no reasonable prospect of developing the equatorial regions. (For railways, canals, telegraph, etc., see articles **MEXICO**, **AMERICA**, **UNITED STATES OF**, and the series of articles under **CANADA**.)

*Commerce.*—See article **AMERICAN COMMERCE**.

*Political Divisions, Geology, Climate, Rain-*

## NORTH AMERICA

*fall, Natural Sections, Flora, and Fauna.*—See article AMERICA.

*History.*—See AMERICA, DISCOVERY AND COLONIZATION OF; also articles under general heading UNITED STATES (Department of History of the United States).

*Ethnology.*—The most important fact to be considered under this sub-title is that European race elements have blended to such an extent that it is impossible at the present time to state accurately the proportions of the white races in the population of the continent. Figures purporting to give this information should be rejected as fallacious. To illustrate this fact, let us select the German element in the United States, which has been studied rather more thoroughly, perhaps, than any other during the last few years.

In 1904 the quarterly publication of the German-American Historical Society of Illinois, entitled *Deutsch-Amerikanische Geschichtsblätter*, contained an article by Mr. Ernest Bruncken in which the assertion was made that "the German element of the population of the United States at the present time produces only about one-third as many prominent men as it ought to, in view of its numbers;" and the author of the article, writing in German and addressing people who read that language more easily than any other, referred to his conclusion as though it were a thing not to be doubted—"a somewhat shameful or humiliating fact." We shall consider this "fact" briefly in connection with a recent book, also written in German by an American citizen, *The German Spirit in the United States of America*, by Dr. Julius Goebel, professor of German philology and literature at Stanford University. With an enthusiasm that makes his book exceedingly readable, Professor Goebel calls upon all German-Americans to be united as *Germans*. In the preface he says that the greater part of the real work of colonization in North America was done by Germans, explaining this statement and supporting it by an extensive historical survey which shows "that the opening of the vast western part of America was begun by the Germans of Pennsylvania and continued and completed by the masses of German immigrants eagerly following in their footsteps. True, the people of other nations—English, French, and especially Irish and Scotch—also participated in this pioneer work," but the lion's share in the quiet colonizing which laid the foundations of America's wealth is ascribed to Germans. His contention is, that a race which in the childhood of America rendered the service he measures, or so earnestly tries to measure, should make its influence felt proportionately in the nation now arrived at man's estate. He thinks that the Germans should act as a mighty unit in the endeavor to preserve in the new nation the German conception of life, and above all the mother tongue.

A reply to such typical assertions or appeals, if it is to be quietly convincing, and not merely rhetorical, must be sought in a study of the records of the settlements and of the subsequent growth of population in the various parts of the country. The records will aid us to form a clear idea in

regard to the limitations of our knowledge of the ancestry of German-Americans and of those from whom the writers mentioned above seek to distinguish German-Americans. Fortunately a scholarly presentation of the results of such studies lies before us, in the form of a series of articles contributed to the *Deutsch-Amerikanische Geschichtsblätter* during 1903 by Mr. Emil Mannhardt; and we adopt Mr. Mannhardt's conclusions because that homœopathic course seems uncommonly appropriate.

Mr. Mannhardt says that in the year 1790 German blood ran in the veins of about one-fifth of the population of the United States. In 1830 the Anglo-Saxon-Puritan element numbered 2,964,717; the German element, 2,695,167; and the American population in which the several European strains had already become so thoroughly blended as to be no longer easily distinguishable, 4,852,717. At the century's end he finds in the United States 25,477,583 Germans, as compared with 12,713,036 descendants of the "American" inhabitants in 1830, and 12,118,640 Anglo-Saxons. The Teutonic element (Germans, Scandinavians, Dutch, and Belgians) is given as 43 per cent. of the total white population.

But very little reflection upon the foregoing figures will be required to convince our readers that in the course of a century a large part of the German element must have become by intermarriage thoroughly amalgamated with the descendants of British colonists and the nineteenth-century immigrants from Great Britain. It is a fair presumption that the influence of German blood may be traced in the careers of very many of the prominent Americans whose names give no certain indication of their German origin, or of German blood derived through some ancestress. An analysis of Mr. Mannhardt's figures shows, furthermore, that the appeal to German-Americans to unite as *Germans* is addressed to at least twelve or thirteen millions of people whose ancestors were citizens of the United States before 1830.

A full statement as to immigration after 1821, showing both percentages and the total number of persons reaching the United States from foreign countries, will be found in the article AMERICA, UNITED STATES OF. See also IMMIGRATION TO THE UNITED STATES; discussion of ethnologic subjects in the articles MEXICO; the series in DEPARTMENT CANADIAN HISTORY AND DEVELOPMENT, etc., and INDIANS, AMERICAN. The following list of countries from which currents of immigration have flowed to North America is not quite complete, yet suggestive enough: Ireland, England, Scotland, Germany, Norway, Sweden, Denmark, Italy, Russia, Poland, Canada, Newfoundland, Spain, France, Austria-Hungary, Holland, Belgium. In this connection see articles NEGRO IN AMERICA, NEGRO EDUCATION.

Consult Farrand, 'Basis of American History,' Harper & Bros., 1904; Semple, 'American History and Its Geographic Conditions,' Houghton, Mifflin, 1903. See also ART, AMERICAN; AMERICAN LITERATURE; UNITED STATES, INDUSTRIES OF THE. MARRION WILCOX,

Author 'History of War with Spain,' etc.

## NORTH AMERICAN INDIANS—NORTH ANNA

**North American Indians.** See **INDIANS AMERICAN**, *North American Stock*.

**North American Phalanx**, the most important colony founded by the Fourierists in the United States. It was organized in 1843, and located in Monmouth County, N. J., about 40 miles south of New York. The organization was on the joint stock principle, and all the members were engaged in the co-operative labor of the colony; they were paid a certain amount for labor, for talent (or administration) and for capital invested; the rule was to pay the highest prices for the hardest and most disagreeable labor. The labor was at first mostly agricultural, products being sold outside the colony; but later mills were built and a considerable amount of manufacturing done. A common school education was provided. The life was simple and pleasant, there was a library and reading room, but the colony lacked many of the elements of culture that distinguished the life of Brook Farm (q.v.). The management was good, and for many years the colony prospered; in 1853 dissensions resulted in a secession of some of the members, and the founding of a new phalanx; in 1854 the mills were burned down, a serious loss that badly crippled the colony; and in 1856 the organization was formally dissolved. Consult Noyes, 'History of American Socialisms.'

**North Andover**, Mass., town in Essex County; on the Boston & M. railroad; about 30 miles north of Boston. It was a part of Andover until 1855 when it was incorporated as a town. It is a manufacturing place, but a large portion is reserved for residential purposes, and it is noted for its beauty and healthfulness. The chief manufactures are woolen goods, mill machinery, and wood products. The government is administered by town meeting. The waterworks are owned and operated by the town. Pop. (1890) 3,742; (1900) 4,243; (1910) 5,529.

**North Anna, Operations on the.** After the loss of 18,000 men in assaulting Gen. Lee's lines at Spottsylvania Court House, Gen. Grant concluded to turn Lee's position by a movement that would bring him nearer to Richmond, and possibly interpose his army between Lee and that place. The movement was begun on the night of 20 May 1864 by Hancock's Second corps, which, preceded by Torbert's cavalry, marched for the Mattaponi and North Anna rivers. Torbert attacked and drove Kemper's brigade from an intrenched position at Milford Station and across the Mattaponi, Hancock following and intrenching beyond the river on the 21st. Other corps followed Hancock, and Grant's advance reached the North Anna in the forenoon of the 23d at Island and Jericho fords and Chesterfield bridge, the latter a mile above where the Richmond and Fredericksburg Railroad crosses the river. But Lee was in his front. He had detected the movement and put his army in motion for Hanover Court House, and on the morning of the 23d was south of the North Anna, in position covering the roads and railroads leading to Richmond. Here he was joined by Gen. Breckinridge from the Shenandoah Valley, and by Pickett's division from near Richmond. Ewell's corps was on the right, Anderson's in the centre, and A. P. Hill's on the left. Breckinridge and Pickett were in reserve. Gen. Warren, with the Union Fifth

corps, crossed the river at Jericho Ford, constructed a pontoon-bridge, and at 4:30 P.M. of the 23d his entire corps was in line of battle about half a mile from the river and on the edge of a wood next to it, the front being covered by the wood. Cutler's division was on the right, Griffin's in the centre, and Crawford's on the left, its flank resting on the North Anna. About 6 P.M. Wilcox's division of A. P. Hill's corps fell upon Cutler's division and part of Griffin's, driving back Cutler in some disorder, following him, and uncovering Griffin's right; but Griffin drew back his right, Bartlett's brigade hastened to his support, and Wilcox was driven back with a severe loss in killed and wounded, and nearly 1,000 prisoners. Warren lost about 350 men. About the same time Hancock had prepared to force a passage at Chesterfield bridge. A part of Kershaw's division held a bridge-head north of the stream; that was charged and carried about 6 P.M. by the brigades of Cols. Pierce and Egan, with the loss of 150 men, the Confederates retreating across the river. The crossing of the river by Warren, and Wilcox's unsuccessful effort against him, forced Gen. Lee to change and shorten his line during the night of the 23d, until it was nearly in the form of a right-angled triangle, with the right angle opposite Ox Ford and extending down the river three fourths of a mile, then southeast to near Hanover Junction. The left, under A. P. Hill, ran from Ox Ford southwest across the Virginia Central Railroad to Little River. On the morning of the 24th Hancock crossed the river unopposed, and began to intrench within 700 yards of Lee's line, where about 6 P.M. Smyth's brigade was attacked and became sharply engaged. Barlow's division was got ready to attack, but Lee's intrenchments were found so strong that the attack was abandoned. At the same time Wright's Sixth corps crossed the river at Jericho Ford and joined Warren. Burnside's Ninth corps arrived at Ox Ford but could not cross in the front of the blunt angle of Lee's line holding the south side, upon which Potter's division was sent to the left and crossing lower down, formed on Hancock's right, while Crittenden's division moved up stream to near Quarles' Mill, and crossing joined Crawford's division of Warren's corps. Crittenden, supported by Crawford, moved forward to connect with and open the way for Wilcox's division to cross, but was attacked by Mahone's division and driven back with severe loss. Everywhere Lee was found well intrenched. Grant found himself in a false position; his two wings on one side of a stream, difficult at all times to cross, and liable to sudden rise by heavy rains, while his centre was on the other side, with Lee's centre like a blunt wedge, standing ready to receive him, and interposing between his wings, neither of which could support the other. The trains were ordered to recross the river on the 25th, and on the night of the 26th Grant recrossed and, marching to the left 32 miles, crossed the Pamunkey at and near Hanover Town by the afternoon of the 28th, and was in connection with his new base at White House. Consult: 'Official Records,' Vol. XXXVI.; Humphreys, 'The Virginia Campaign of 1864-65'; Walker, 'History of the Second Army Corps'; Grant, 'Personal Memoirs,' Vol. II.; Pennypacker, 'Life of



## NORTH ATTLEBORO—NORTH CAROLINA

Gen. Meade'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.

E. A. CARMAN.

**North Attleboro**, ăt'l-bŭr-ō, Mass., town in Bristol County; on the New York, N. H. & H. railroad; about 30 miles southwest of Boston. It includes the villages of Oldtown, Adamsdale, Falls Village, and Robinsonville. It was settled in 1637 and incorporated in 1887. The chief industries of the town are connected with the manufacturing and sale of jewelry. It has establishments for the manufacture of boxes, buttons, braid, cotton yarn, rope, silverware, machinery and supplies for the jewelry business. Some of the prominent buildings are the G. A. R. Memorial Hall, the Holmes Memorial building, the high school, and the Richards Memorial Library. The government is administered by town meetings. The town owns and operates the electric-light plant and the waterworks. Pop. (1890) 6,727; (1900) 7,253; (1910) 9,562.

**North Bay**, Canada, town in Nipissing district, in the Province of Ontario; on the north shore of Lake Nipissing, and on the Grand Trunk and the Canadian P. R.R.'s. A United States consul is stationed here. It is a favorite resort for sportsmen on account of the abundance of fish and small game.

**North Berwick**, bĕr'ĭk, Scotland, a fashionable watering-place, formerly a fishing village of Haddingtonshire, at the entrance to the Firth of Forth, 23 miles northeast of Edinburgh. Behind it rises conical North Berwick Law (612 feet). Tantallon Castle three miles east fronting the Bass Rock is a magnificent ruin, finely described in Scott's 'Marmion.' Pop. about 3,000.

**North Borneo**. See BORNEO.

**North Brabant**, brā-bănt' or brā'bănt, Netherlands, a frontier province bordering on Belgium. See BRABANT; NETHERLANDS.

**North Braddock**, Pa., borough in Allegheny County; on the Pennsylvania railroad; about six miles east of Pittsburg and two miles east of Homestead. It was a part of Braddock until 1897. It has extensive steel rail interests, but a portion of the borough is a residential reserve. The government is vested in a burgess, who holds office three years, and a council. Pop. (1910) 11,824.

**North Cape**. See CAPE NORTH.

**North Carolina**, kăr-ō-lĭ'na, one of the original 13 colonies, midway between Maine and Florida; bounded by Virginia on the north, by Tennessee on the west, by South Carolina and Georgia on the south and southwest and the Atlantic Ocean on the east. It extends from lat. 35° 51½' to 36° 33' N., and lon. 75° 27' to 84° 20½' W. from Greenwich, taking the greatest width each way. Tennessee originally was part of North Carolina, but in 1790 was ceded by it to the United States.

**Area**.—North Carolina ranks the 19th State in size in the Union, and is the largest on the Atlantic coast save Georgia and Florida. It contains 52,286 square miles (including the area 3,620 square miles of its sounds and rivers) and is slightly larger than England. Its surface is very nearly a one thousandth part of the land area of the globe. Its greatest length from east

to west, from "Cherokee to Currituck" is more than 500 miles and its greatest width north and south is 188 miles.

**Topography**.—The State is divided by nature into three divisions—Eastern, which is generally level, with many swamps and sandy, farther back with two great sounds near the ocean, the Albemarle and Pamlico; the Central or hilly regions; and the Western which is mountainous. The coast line of more than 300 miles runs at first east of south, thence southwest. Along the whole ocean coast stretches a chain of narrow, barren sand banks, broken occasionally by inlets which are constantly changing, occasionally filling up entirely in the course of years and new ones being opened by storms. The Eastern Division extends inland from the ocean about 150 miles. The dividing line between it and the Central Division trends southwestwardly and was once the shore line of the ocean, all east of it having been in prehistoric ages the bed of the sea. This line is clearly marked by the falls of the rivers. This Eastern Division contains the two great sounds already named into which the Chowan, the Roanoke, the Tar, the Neuse, and other rivers pour their waters. Farther south, the Cape Fear and its tributaries empty directly into the Atlantic. The Central Division, beginning at an elevation above sea-level of about 200 feet, extends an average width of 200 miles westwardly, rising gradually to an average elevation of 1,200 feet or more at the foot of the Blue Ridge. The western part of this Central region is called the "Piedmont section." The Western Division contains 6,000 square miles and has an average elevation of 2,500 feet. The highest peaks east of the Rocky Mountains are to be found here. The highest of them, Mount Mitchell, is 6,688 feet. There are no less than 24 peaks which are higher than Mount Washington in New Hampshire. The principal mountain ranges are the Blue Ridge and Great Smoky Range, but there are also, the Black Mountains and the Balsam. The general trend is from northeast to southwest.

**Rivers**.—The rivers of North Carolina are numerous, but they are navigable only to the falls, the old shore line of the ocean in the east, hence the grand total of near 3,500 miles (of which scarcely more than 400 miles is navigable) indicates a vast water power which marks out the future of this State as one of the greatest manufacturing States in the Union. Indeed it may be well doubted if there is another which equals it in water power. At the "narrows of the Yadkin" the river has a fall of 50 feet in a distance of two miles.

**Sounds and Lakes**.—Besides the two great sounds, Albemarle and Pamlico, there are smaller ones, Currituck, Croatan, Roanoke, Core and Bogue. There are many lakes, the largest being Alligator, Phelps, Mattamuskeet, Pungo and Waccamaw. The largest (Mattamuskeet) has an area of 100 square miles, and Lake Phelps is about half as large.

**Capes and Bays**.—From the shore line jut out Cape Hatteras and Cape Lookout, between which is Raleigh Bay. Lower is Cape Fear, between which and Cape Lookout lies Onslow Bay. South of Cape Fear is Long Bay. The ocean front of North Carolina is considered the most dangerous on the Atlantic seaboard.

## NORTH CAROLINA

**Islands.**—Roanoke Island between Albemarle and Pamlico sounds is the largest in the State and has an area of about 25 square miles. This island was the scene of the first English settlement on this continent, in July 1585. Here also was born the first child of the English race on this continent, Virginia Dare, 18 Aug. 1587. This colony made under the auspices of Sir Walter Raleigh (in whose honor the capital of the State is named) was soon abandoned. Cedar Island is nearly as large. Smith's Island at the mouth of the Cape Fear has nearly 15 square miles.

**Climate and Rainfall.**—The mean temperature is 59 degrees or about the average temperature of the Northern hemisphere. The State is on the same isothermal line as middle California, southern France and northern Italy. The rainfall is 60 inches for the eastern belt, 45 inches for the central and 58 inches for the western.

**Geology.**—The Eastern Division is covered with a stratum 50 to 300 feet thick of Tertiary sands and clays. It shows numerous marl deposits and phosphate beds. Through the Central part of the State is a three foot seam of triassic, not carboniferous, coal which is estimated to cover 70 square miles. The Western part of the State shows azoic formations only.

**Soil.**—The soil of the eastern division is generally sandy. Along the rivers are extensive bottom lands of clayey loam, which are very fertile, while the swamp lands have a deep, peaty black soil, and when drained are exceedingly fertile. In the central and western divisions the soil is clay, and gravelly or sandy loam.

**Agricultural Products.**—North Carolina is the only State that fills every blank in the Census of farm products, yielding all the crops grown in both the northern and southern sections of the Union. Its greatest crops, however, are corn, cotton and tobacco. Cotton is grown in the Eastern Division and in the southern half of the Central Division. The yield in 1912 was 1,106,000 bales, eight times the quantity produced by this State in 1861, being the largest percentage of increase shown by any State since the Civil War, save Texas. In tobacco production North Carolina is second only to Kentucky and the area has been steadily increasing. Nine tenths of the tobacco known in the markets of the world as "Virginia Brights" is grown in North Carolina. Corn is grown in every county. Rice is produced in large quantities in the Eastern Division and in the production of sweet potatoes the State stands first. In the last few years there has sprung up a great trucking industry, which extends from Currituck to Brunswick. Grape culture has largely increased of late years and no small quantity of wine is produced and shipped.

**Timber.**—The extent and value of the forests are especially noteworthy ranging from the palmetto, magnolia and live oak around Wilmington to the fir, hemlock and white pine in the mountains of the west. The vast quantities of pine and cypress, and of hardwoods specially oak, hickory, ash, walnut and gum have not only attracted saw mills but have created large furniture factories at High Point and at other places. Of the various species of trees found in the States east of the Rocky Mountains all the

eight varieties of pine, the seven varieties of magnolia, the five varieties of maple, and both varieties of walnut are found in North Carolina, while it produces 19 out of the 20 varieties of oak, four out of the five varieties of spruce, three each out of the five varieties of elm and birch respectively and six of the eight varieties of hickory. Immense quantities of turpentine, rosin, tar and pitch are also produced from the vast tracts of pine forests.

**Fauna.**—Deer, red and gray foxes, raccoons, squirrels, opossums and rabbits are numerous, while wolves, bear, wildcats, beavers and others are still to be found. Swan, geese, brant and wild duck swarm in the sounds, bays, and rivers of the east in the cold months, while in all parts of the State quail, woodcock, snipe, doves and wild pigeons, larks, and many other birds are numerous. The attraction to sportsmen has been so great that a close season for game has been enacted by the legislature, and recently an Audubon Society has been authorized by the legislature for the protection of birds.

**Fisheries.**—More than 12,000 men are employed in the fisheries on the sounds and at the mouths of the rivers. More than \$1,500,000 capital is invested. The shad and herring fisheries are especially valuable. Many of the seines are from a mile to three miles long and are operated by steam power. There are 26 counties interested in this industry, the principal ones being Currituck, Pasquotank, Chowan, Bertie, Beaufort, Dare, Pamlico, Craven, Carteret, Onslow, New Hanover and Brunswick. Herring are mostly cured in salt and shipped in barrels, but the shad, striped bass, chub, perch, and other fish are shipped on ice, the large fisheries having each its own ice factory. The State in 1876 organized its fish commission, establishing fish hatcheries which largely increased the catch of fish. Of recent years the United States government has taken over this work and has a shad and herring hatchery at Edenton and a similar establishment for rock bass and salmon at Weldon, at the falls of Roanoke River. The young fish thus hatched are set free in all the principal rivers and waters of the State and in other States, some being shipped even to the rivers of the Pacific coast. The oyster and shell fish industry in the eastern waters are also of great value. The State has an Oyster and Shellfish Commission which owns a steamboat and has many agents to encourage and protect this industry. The oysters are of fine quality, those of New River being especially prized. Diamond-back terrapins and turtles are found all along the coast and are shipped north and inland, as are also large quantities of clams.

**Navigation.**—Vessels drawing 24 feet can ascend the Cape Fear River 30 miles to Wilmington, while the river is navigable 120 miles further to Fayetteville, to which point the Federal government contemplates deepening the channel to 8 feet. Th Roanoke is navigable 130 miles to Weldon, the Tar and the Neuse about 100 miles each and the Chowan for 75 miles. Two canals connect the Albemarle and Pamlico Sounds with Chesapeake Bay, and Congress has before it a bill to establish an inland water-way along the whole front of the State by deepening the sounds which lie behind the sand banks which fringe the seaboard.

**Manufactures.**—The water power of the

## NORTH CAROLINA

State owing to the great non-navigable length of its rivers and streams is very great, in fact more than twice enough to manufacture the entire cotton crop of the South. Already the State has more cotton factories than any other in the South and is a large manufacturer of tobacco. Other factories of all kinds have greatly increased in number. There are over 50,000 persons employed in tobacco manufacturing and over 40,000 in the cotton factories. Child labor under 12 years of age is forbidden by law in factories of all kinds. The chief manufactures of tobacco are to be found at Durham, Winston, Reidsville, and Henderson. There are also cotton factories at those points and at Charlotte, Raleigh, Concord, Salisbury, Fayetteville and at other towns as well as at many points on the streams remote from towns, especially in Alamance and Gaston counties, which counties have the largest number of cotton factories of any in the State.

**Minerals.**—The State has areas of coal, copper, gold, mica, iron, corundum, kaolin and marl. The last is to be found only in the eastern part of the State, the others in the centre and west. Silver, lead, zinc, zircon, graphite and manganese are also found. The deposits of iron are widely distributed over the State, the most abundant kind being the magnetic. The Cranberry iron mine in Mitchell County yields an ore unsurpassed in the world. There are two bituminous coal fields—one in Chatham and Moore counties and the other in Stokes and Rockingham. Both are in close proximity to extensive deposits of iron. Gold is found in 29 counties, mostly in the centre and west of the State, and more than 40 mines are being worked. Up to the discovery of gold in California, North Carolina was the largest gold producing State in the Union; the total yield up to date has been about \$30,000,000. Tin has been found in Cleveland County. At one time three fourths of all the mica in the world was mined in this State and largely in Mitchell County. It is of a superior quality and plates three and four feet across are not unusual. Beautiful marble underlies large sections of Cherokee and Clay counties in the extreme west. Granite, sandstone, and porphyry are to be met with in large quantities, and superior stone for grist mills is quarried in Moore County. Near Wilmington are valuable phosphate beds. The State produces more corundum than any other locality in the world and of the best quality. The valuable gems, diamonds, emeralds, rubies, garnets, amethysts, opals, agates and hiddenites are found. A fine exhibition of minerals, gems, marbles and stones of all kinds is to be seen in the Museum of the State Agricultural Department at Raleigh. At Dunn's Mountain near Salisbury is an exhaustless supply of granite almost as white as marble, and at Mount Airy is an equally large quarry of light gray granite. Near Raleigh is the granite quarry from which the material for the State Capitol was taken. Indeed granite quarries of good quality are to be found in most of the counties and sandstone quarries are numerous. Mineral springs are numerous, the most noted being the Panacea Springs in Halifax County and the Seven Springs in Wayne in the east, while in the centre and west are the Hot Springs in Madison, the Sulphur Springs in Jackson, the Glen

Alpine and Connelly Springs in Burke, the Vade Mecum Springs in Surry, the Lithia Springs in Lincoln, Cleveland Springs in the county of that name, Jackson Springs in Moore, and there are many others. Among natural objects of interest are Mount Mitchell, the highest peak on this continent east of the Rocky Mountains; Linnville and Cullasaja Falls; Hickory Nut Gap and the adjacent Chimney Rock; Table Rock and Paint Rock.

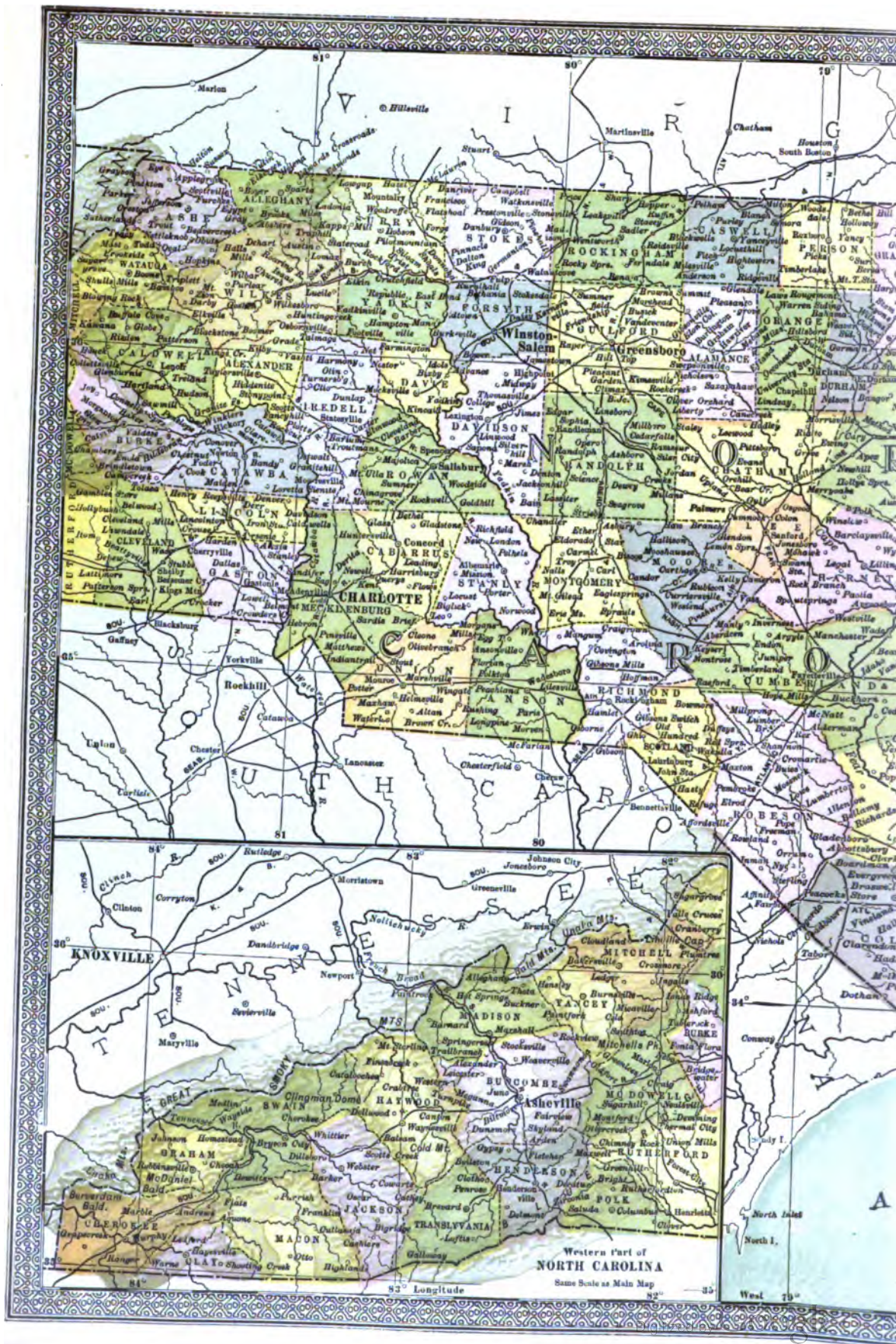
**Railroads.**—There are now about 4,500 miles of railroad in operation and several hundred miles more under contract or in contemplation. There are street railways in all the larger towns and a few miles of rural trolley lines with many more proposed. The four principal railway systems are the "Southern" the "Seaboard Air Line", "Norfolk Southern" and the "Atlantic Coast Line." The railroads are valued for taxation at \$70,000,000, but this is much less than half their true value, as they were returned in the census of 1890 as then worth \$151,000,000.

**Government.**—The present constitution, adopted in 1868, amended by a convention in 1875 and by several amendments submitted by legislatures since and ratified by the people, provides for an executive department consisting of a governor (not re-eligible), a lieutenant-governor, secretary of state, treasurer, auditor, superintendent of public instruction, commissioner of agriculture and commissioner of labor, all elected by the people for four years. There is also a commissioner of insurance elected by the legislature, and a corporation commission of three members elected by the people for a term of six years. The legislative department consists of 50 senators and 120 members of the house of representatives elected by the people every two years. The judicial department consists of a supreme court composed of a chief justice and four associates chosen by the people for eight years and 16 superior court judges, who are chosen for the like period by the people and who ride in rotation each of the 16 superior court districts into which the State is divided.

**Education.**—North Carolina was the second State to establish a State University, which it did in 1789 at Chapel Hill. It has now also the State Agricultural and Mechanical College at Raleigh and a State College for Women at Greensboro. These three constitute a complete system of higher education by the State. There is also a State Agricultural and Mechanical College for the colored at Greensboro. There are also many sectarian colleges, of which the Baptists have one at Wake Forest, the Presbyterians at Davidson, the Methodists at Durham, and there are others. There are also several colleges for women, and three colleges for the colored people. As early as 1825, the State provided a public school fund and in 1840 established a public school system. This now provides instruction in primary and intermediate grades, free of charge, to all children between the ages of 6 and 20. There is an annual appropriation for normal institutes for the instruction of both white and colored teachers. The public school system supported by State appropriations is supplemented by graded schools for free education maintained in all the larger towns by local appropriations. The public funds for education are divided between the



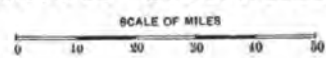








# NORTH CAROLINA



- Railroads . . . . .
- Canals . . . . .
- State Capitals shown thus: . . . . .
- County Seats shown thus: . . . . .





## NORTH CAROLINA

whites and blacks per capita. Besides the State Library of 60,000 volumes, and the Law Library of the Supreme Court of 30,000 volumes, both at Raleigh, several towns have public libraries and the University and all the colleges maintain libraries. The State has also established libraries for the public schools in the rural districts.

*Penal and Charitable Institutions.*—The State has established a penitentiary at Raleigh, three insane asylums—one at Goldsboro for the colored people, the other two for the whites at Raleigh and Morganton. There is an Institute for Deaf Mutes for the whites at Morganton and one for the colored deaf, dumb and blind at Raleigh and an Institute for the Blind for the whites also at Raleigh.

*Counties.*—There are 100 counties, of which Robeson is the largest and New Hanover the smallest. Wake has the largest population and Graham the smallest. There are railroads in all the counties except seven.

*Cities.*—The principal towns are Wilmington, the chief seaport, 30 miles above the mouth of the Cape Fear, up to which vessels can come drawing 24 feet; Raleigh, the State capital, named in honor of Sir Walter Raleigh; Charlotte, Greensboro, Salisbury, Statesville, and Winston in the central part of the State; Asheville, Waynesville and Morganton in the west, and Fayetteville, Goldsboro, Washington, Elizabeth City, New Bern and Beaufort in the east, the last four being like Wilmington, seaport towns.

*Colonies.*—There is a growing stream of immigration from the North, which in some instances has taken the form of colonies, the most successful and prosperous of which is at Southern Pines in Moore County. This State has the smallest per cent of foreign population in the Union, and indeed irrespective of percentage the smallest foreign population of any State.

*Population.*—By the census of 1910 North Carolina had a population of 2,206,287; of which 1,500,513 were whites; 697,843 were negroes and 2,015 Indians. There were 1,098,471 males and 1,107,816 females. There were something more than two whites to every negro. The bulk of the negro population is in the eastern division and the southern half of the central division. There are very few negroes in the mountain country.

*History.*—The coast of North America was first seen by John Cabot in 1497, and 87 years later the first attempt by the English to establish a colony on this continent was made by Sir Walter Raleigh, whose exploring expedition of two ships arrived at Wokoken Inlet on the coast of North Carolina 4 July 1584. This expedition landed at Roanoke Island and carried back two savages, Wanchese and Manteo. The next year Raleigh sent out a fleet of seven ships under Sir Richard Grenville which settled 108 colonists on the Island under Gov. Ralph Lane. Falling into straits for want of food, these colonists were taken home in June 1586 by Sir Francis Drake, who was returning with his fleet from a raid upon the Spaniards in the West Indies. Soon after they left, Sir John Grenville arrived with relief, but not finding the colony, left 15 men and returned home. In 1587, a new colony consisting of 89 men, 17 women and 2 children

came out under Gov. John White. His daughter, the wife of Ananias Dare, on 18 Aug. 1587 gave birth at Roanoke Island to Virginia, the first child of English parentage born on this continent. Gov. White soon returned to England, but the Spanish Armada of 1588 prevented aid being sent to the colony till 1590, at which time the colony had disappeared and the fate of the "Lost colony of Roanoke" is one of the unsolved problems of history. The next settlement by the English was made at Jamestown, Va., in 1607. In 1629 a grant of Carolina was made to Sir Robert Heath and an abortive attempt at settlement was made in 1639. Gradually scattering settlers came into the Albemarle and Pamlico region from Virginia, and in 1660 a New England colony bought land from the Indians and settled near the mouth of the Cape Fear. They soon left, but were succeeded in 1663 by a colony from Barbados under Sir John Yeamans, who repurchased the land from the Indians. This settlement was abandoned in 1690. On 24 March 1663 Charles II. granted to the Duke of Albemarle (the restorer of the monarchy) and seven others, as Lord Proprietors, all the country between the Atlantic and Pacific Oceans and between latitudes 36° and 31°, and William Drummond was appointed Governor. In 1665, a second charter to the same Lord Proprietors was granted, extending the limits to lat. 36° 30' on the north. The first legislature was held in 1665. In 1669 the "Fundamental Constitutions of Carolina" drawn up by the famous John Locke were adopted by the Lords Proprietors and were sent out to the colony. They proved too elaborate and cumbersome for the handful of pioneers, residing mostly in the northeast of the province, on Albemarle Sound, and after a nominal existence they were repealed in 1693. Twenty proprietary governors followed in rapid succession. For the most part, save Drummond and Archdale, they were very unfit, and often unworthy men. The sturdy colony deposed six of them and sent them back. One (Sothel) they put into prison and forced him to take an oath of abdication. In 1677 under Gov. Culpeper there was open rebellion on account of undue taxation on tobacco and interference with trade regulations. Again in 1708 under Thomas Carey there was a rebellion on account of the taxation of Quakers and Dissenters for the support of the Established Church. For more than two years there was no government of any kind in force, the farmers attending to their crops and "doing and saying what they list." In 1691 was adopted a system of having one governor for Carolina with a lieutenant-governor each for Albemarle and Charleston, the two principal settlements. In 1708, Bath was incorporated as the first town. In 1710, Gov. Hyde, a cousin of Queen Anne, came out as the first governor of North Carolina. On 20 Sept. 1711 the Tuscarora Indians, by preconcert, fell upon and massacred the settlers on the Roanoke, Neuse and Pamlico. The war lasted two years, but with the aid of troops from South Carolina the power of the Indians was broken with the capture of their fort at Nahucke in the spring of 1713. In 1718, Edward Teach, commonly known as "Blackbeard," the leader of the pirates who had troubled the colony, was killed in a sea fight off Bath, which put an end to piratical depredations. In 1728

## NORTH CAROLINA

the long boundary dispute with Virginia was settled, the line being surveyed to the foot of the mountains. In the same year seven of the lord proprietors sold out their interest to the crown for \$87,500. Earl Granville retained his one eighth which was set off to him as a strip of land, 70 miles wide, next to the Virginia boundary, though he surrendered all right to share in the government. At this time there were three counties, Albemarle, Bath and Clarendon, divided into eight precincts. In 1729 the above counties were abolished, the precincts becoming counties, and the colony being definitively divided into North Carolina and South Carolina. The population of North Carolina was then about 40,000. The Royal government thus established continued until the Revolution. There were five Royal governors, George Burrington 1729-34; Gabriel Johnston 1734-1752; Arthur Dobbs 1754-1765; William Tryon 1765-71; Josiah Martin 1771-75. During this period immigration came in rapidly, mostly from Virginia and Pennsylvania, so that at the outbreak of the Revolution the population had risen to 300,000 and there were settlements to the mountains and beyond. There were Scotch settlements made after Culloden on the Cape Fear. Germans and Moravians came in by way of Pennsylvania, from which also and from Charleston came many Scotch-Irish. In 1740 the Province sent a battalion to join the English expedition against Carthage in South America. In 1749 the first printing-press was set up. The first book was printed in 1752 and a crude postal service was established in 1755. In 1758 the colony set a regiment under Col. James Innes to Winchester, Va., to take part in the war against the French and Indians, and soon after sent other troops under Hugh Waddell against the Cherokees in the west of the province. The colony openly resisted the Stamp Act and on 16 Nov. 1765 forced the stamp master, William Houston, to resign his office and to swear not to receive the stamps. In February 1766 under the leadership of Hugh Waddell and John Ashe the inhabitants of Wilmington, without using any disguise, boarded the *Viper*, sloop of war, and demanded and obtained the release of certain merchant vessels which had been seized on account of failure to observe the Stamp Act. A few days later 700 armed militia surrounded the house of Gov. Tryon and took therefrom in his presence the comptroller of the province and forced him to do what Houston had done. In 1765 an agitation began against the exaction of exorbitant official fees, and poll-tax, which culminated in open war, known as the Regulators War, in which the insurgents were crushed by Gov. Tryon at the battle of the Alamance 16 May 1771. This was really the first bloodshed in the Revolution. In August 1774 a Provincial Congress was held in New Bern in defiance of Gov. Martin's prohibition, which elected delegates to the Continental Congress. In Edenton 51 women held the famous "Tea Party," subscribing to a paper to boycott the use of East India tea and to abide by the action of the Provincial Congress. Patriotic meetings were held in many counties. Soon after the receipt of the news of Lexington and Concord, the people of Charlotte assembled, 20 May 1775, and declared the country independent of Great Britain and

by special messenger sent a copy of their proceedings to the Continental Congress. This was the first declaration of the kind in America. In honor of this event, "20 May 1775" is borne on the State seal. Gov. Martin fled from New Bern 14 June 1775 and took refuge on a British man of war. On 12 April 1776 the new State instructed its representatives in the Continental Congress to vote for independence, being the first State to do this. A free Constitution was adopted in that year. The first victory for the patriot cause was that gained by the North Carolina militia at Moore's Creek 27 Feb. 1776. The State furnished ten regiments of "Continental" Regulars and many thousands of militia for shorter "tours of duty." In 1780-1 the State was invaded by Cornwallis. On 7 Oct. 1780 a most damaging blow was inflicted on him by the destruction of Ferguson and his detachment at King's Mountain, the bulk of his assailants being from North Carolina and Tennessee (then a part of North Carolina). On 15 March 1781 was fought the battle of Guilford Court House. The Americans under Greene retired, but the result was a practical defeat for Cornwallis, who fell back to Wilmington, whence he marched to his fate at Yorktown. North Carolina was represented in the Federal Constitutional Convention at Philadelphia in 1787, but it was the last State but one to ratify the Constitution, which it did not do till assured for the adoption of the first ten amendments to that instrument. It rejected the United Constitution in 1788, but ratified it in November 1789. Thus it did not participate in the first election for President. At the first census, 1790, it was the third State in point of population (391,000), coming after Virginia and Pennsylvania only, and ahead of New York and Massachusetts.

One of the first acts of the State as a member of the Union was the cession of Tennessee, which was accepted by the United States 2 April 1790. The permanent capital was located at Raleigh by statute in 1791. There soon set in a tide of emigration to Tennessee, then to other Southern and Western States, so that North Carolina which in 1790 ranked third in population was only eleventh in 1840. This tide showed no slackening until after 1850. In the War of 1812 the State furnished nine regiments, two of which went to Norfolk, and one to Jackson's aid in the Creek war. Capt. Johnson Blakely of Wilmington commanded the United States sloop *Wasp* and destroyed many English ships. Among its many privateersmen who preyed on the enemy's commerce Capt. Otway Burns was the most famous. In the Mexican War the State sent a regiment and two companies.

North Carolina was the next to the last State to enter the Federal Union in 1789 and she was the next to the last to leave it in 1861. The State voted against Secession in February of that year, but when President Lincoln called for troops to coerce the seceding States and Virginia had seceded, North Carolina on 20 May 1861 followed her example. The die was cast, she did her full duty to the cause she had espoused. With a voting population (white) of 112,000 in 1861 she sent over 127,000 men to the Confederate armies. Some 5,000 or more (whites and blacks) joined the Union forces.

## NORTH CAROLINA COLLEGE—NORTH CAROLINA, UNIVERSITY OF

The first man killed on the Southern side in battle was a soldier from this State, and historians claim that the dead left nearest the enemies' lines at the pivotal battles of Gettysburg and Chickamauga were North Carolina's sons, and they fired the last volley at Appomattox. The captures of Fort Hatteras, Fort Fisher, of Plymouth, the battle of Bentonville 19-20 March 1865, and the surrender of Joseph E. Johnston 26 April 1865 were the most notable events of the war which took place on her soil. Wilmington was famous as a port for blockade running and was the last to be closed. Her war governor was Zebulon B. Vance, afterward for many terms United States Senator. The State lost 42,000 killed and wounded, or about one third of the troops she furnished to the Confederacy. In 1868 began the era of Reconstruction, when the blacks were first allowed to vote and the "carpet bag" rule began. The Ku-klux Klan (q.v.) was organized as a protest against this in 1869, and the State was in a turmoil until the whites regained full control of the government. In 1870 Gov. Holden was impeached and removed from office. The State has grown rapidly in population and development since the war. In 1894 and 1896 the Populist and Republican parties combined and carried the State. In 1898 the State again became Democratic and the General Assembly submitted a Constitutional Amendment disfranchising the uneducated negroes, which was ratified by the people in 1900. Prohibition was adopted on a referendum vote in 1908.

WALTER CLARK,

*Chief Justice Supreme Court of North Carolina.*

**North Carolina College of Agriculture and Mechanic Arts**, a technical industrial institution founded in 1889 at West Raleigh. It was the result of a movement that had been agitated for some years by a small but earnest and determined set of men who became convinced that the industrial growth of the State was being retarded by the lack of technically trained men to assist and guide this development. The college opened its doors to students in October 1889, and, like all new enterprises, at first encountered some hostility, a great deal of indifference and incredulity being exhibited as to its power to do the work that was wanted. When the college opened it had only one building, very little equipment, and only five professors present for duty. Since then, nine other large and comfortable buildings have been added, and the shops, the drawing-rooms, the chemical, the physical, the horticultural, the electrical laboratories, the barn, the dairy, and all the class rooms have been equipped with the best modern apparatus to do thorough and practical work. The specific object of the college is to give young men, besides a general education, a technical training that will make them self-sustaining in life, and intelligent directors of agricultural and mechanical enterprises. A regular college course, minus the classical languages but plus scientific studies in particular lines, is offered at tuition fees so low as to attract young men from all parts of the State. Four years' courses are offered in agriculture, civil, mechanical, electrical, and chemical engineering, textile work, cotton manufacturing, and dyeing; the degrees conferred for the completion of these courses are bachelor of

agriculture and bachelor of engineering; there are also graduate courses, two years' courses in agriculture, mechanic arts, and cotton manufacturing, and twelve weeks' courses in agriculture, carpentry, machine shop work, engine and boiler tending, and machine drawing and designing. The experiment station is also connected with the college, and receives an annual Federal appropriation. The college controls the national land grant of 1862, and also receives State and Federal appropriations; in 1910 the income amounted to \$95,000. The library contained 7,500 volumes; the students numbered 570, and the faculty 48.

**North Carolina, University of.** The University of North Carolina is situated among the hills of Orange County in the town of Chapel Hill, 500 feet above the sea. The charter of the university was granted in 1789. The cornerstone of its first building, the Old East, was laid on 12 Oct. 1793, now known as University Day. Its endowment by the State was in the form of old claims on sheriffs and other public officers and escheats, including unclaimed land warrants, to be located in West Tennessee, granted to soldiers of the Continental Line. Only a small sum was realized from these sources for many years. The money which enabled the doors to be opened in January 1795, was realized from donations in small amounts by friends of education and a loan of \$10,000 by the State, afterward converted into a gift.

The management was at first entrusted to Rev. David Ker, D.D., afterward federal judge of Mississippi Territory, as presiding professor. The post fell successively to Profs. Charles W. Harris, Joseph Caldwell and James S. Gillaspie, but in 1804 the trustees elected Caldwell, a graduate of Princeton, to the office of president. Dr. Caldwell in 1812 resigned the presidency, in order to devote himself to his department of mathematics. His successor, Rev. Robert Hett Chapman, born in New York, held the presidency four years, when Dr. Caldwell was re-elected. In 1835 the residue of the Tennessee lands was sold and an endowment of about \$200,000 realized. The new president, ex-Governor David Lowrie Swain, was widely and favorably known. The number of students increased and when, in the decade beginning with 1850, the South became prosperous, the number of students reached as high as 461 in 1858-9.

The alacrity with which the students rushed into the Civil War may be gathered from the fact that out of the 243 freshmen in the three years ending in 1861 only 16 became graduates. Two hundred and seventy alumni are known to have lost their lives in the struggle. Although numbers diminished, the energy of President Swain kept the doors open until the end of the War, and until the trustees, elected under the Reconstruction Acts in 1868, dismissed all the faculty and suspended the exercises for six months.

The most prominent professors under the old régime were Archibald D. Murphey, afterwards a judge and a forceful advocate of public schools; Rev. William Bingham, founder of the Bingham School; Ethan A. Andrews, an able writer of text-books; Denison Olmsted, author of works on Natural Philosophy, afterwards professor at Yale; Elisha Mitchell, who gave his name to Mount Mitchell, the highest peak east

## NORTH DAKOTA

of the Mississippi, the pioneer of chemistry, geology and mineralogy in the State; James Phillips and Charles Phillips, his son, eminent mathematicians; Walker Anderson, afterwards chief justice of Florida; William M. Green, afterwards bishop of Mississippi; William Hooper, afterwards an eminent preacher and college president; Charles F. Deems, author and pastor of Church of the Strangers, New York; William H. Battle, judge of the supreme court; Albert M. Shipp, afterwards dean of the theological department of Vanderbilt; Nicholas M. Hente, scientific author; A. D. Hepburn, afterwards college president, and other accomplished men.

The endowment of the university was lost during the War. The new president, Solomon Pool, after a year's trial, was forced to close the doors. By a constitutional amendment the general assembly elected a new board of trustees in 1874. These were hindered by legal difficulties, thrown in the way, from taking charge until the next year. The doors were then reopened, alumni and friends repairing the buildings and the general assembly granting a small annuity, coming from the land scrip fund, Rev. Charles Phillips, D.D., being chairman of the faculty. In 1876 Kemp P. Battle, who had been tutor of mathematics in his youth, and afterwards a lawyer and State treasurer, was elected president. Soon an annuity of \$20,000 from the State was secured, and that, with income from endowments and tuition money, enabled the trustees to increase the faculty largely and add to the library and apparatus.

In 1877 the university was the first institution in the South to inaugurate a summer normal school. It was continued with much success, and has been one of the chief agents in arousing the spirit of education in the State.

President Battle resigned his office in 1891, and was succeeded by George T. Winston, professor of Latin, under whose energetic management the numbers rose to 412. He resigned in 1896 to accept the presidency of the University of Texas. Then came Edwin A. Alderman, professor of pedagogics, under whom the institution was still further advancing, when in 1900 he accepted the presidency of Tulane University. The trustees then entrusted the care of the university to the professor of chemistry, Francis P. Venable, under whom the number of students has risen to 622 and the faculty to 66.

Since 1875 the old curriculum of Latin, Greek and mathematics, with a small amount of scientific and other studies, has been abandoned. An equal attention is paid to the sciences, well-equipped laboratories supplied, and courses mapped out leading to the degree of A.B. The departments of the university have been increased until they now embrace a collegiate department leading to the degree of A.B., a graduate department giving the degrees A.M. and Ph.D., a law department having a two-years' course leading to B.L.; a medical department giving two years at Chapel Hill and two years at Raleigh with the degree of M.D., a pharmacy department with a two-years' course leading to Ph.G., and a mining department.

Since its foundation the University of North Carolina has been a chief factor in the development especially of the Southern States. From its walls have gone a national President (Polk), a Vice-President (King), heads of departments

(Branch, Eaton, Graham, Dobbin, Thompson), a solicitor-general (Phillips), a president of the Senate (Mangum), foreign ministers (Miller, Saunders, Barringer, Rencher), and many senators and representatives of the Union, while its alumni have as governors, judges, legislators, preachers, teachers and in corporate and individual private enterprises largely aided in molding our institutions and pushing onward our civilization.

FRANCIS P. VENABLE,  
*President of the University.*

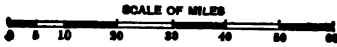
**North Dakota**, da-kô'ta, a northwestern State (No. 26 in the Union), abutting on Canada (Assiniboia and Manitoba), and bounded south by South Dakota, east by Minnesota, and west by Montana. It extends 360 miles east and west and 210 north and south. Area, 70,795 square miles, of which 600 is water. Capital, Bismarck. Pop. (1910) 577,056.

The State is part of the great prairie region, extending far into Canada. Its surface is mostly level or gently rolling. The only tract of considerable elevation as a whole is the Turtle Mountain district in the north centre, about 20 by 40 miles in length, a small part in Canada,—a district of low hills, whose highest points are Butte St. Paul, 2,500 feet, and Bear Butte, 2,400 feet. A great number of isolated buttes, with some short ranges of hills, are scattered through the southwestern portion beyond the Missouri. The generally even surface of the State renders it best classified by the valleys and watersheds of its rivers: (1) The Red River of the North, forming its entire eastern boundary, flows into Lake Winnipeg, through a valley of rich bottom land 50 to 60 miles wide, elevated beyond the reach of overflows, and rising in the north to the Pembina highlands. The chief affluents are the Sheyenne in the south, the Goose in the centre, and the Pembina in the north. (2) The Dakota or James River (French, "Rivière de Jacques"), in the south, is half way between the Red and the Missouri. This is the longest unnavigable river in the world and flows (600 miles) from the central plateau through South Dakota into the Missouri. Its valley is one of the most noted artesian districts on the globe, being underlaid by the Dakota sandstone, a great water-bearing stratum which occupies a large part of the State. (3) The Mouse or Souris River in the north, west of the centre, flowing south by east down from Canada, sweeping around in a great loop and then running north into Canada again, joining the Assiniboine. It is noted for its valuable coal deposits and stock ranges. (4) The Missouri has a navigable course of about 300 miles in the State. Its *coteau* or plateau, a stony upland separating its bed from that of the Dakota, extends in a huge curve through the centre of the State and is dotted with small alkaline lakes. (5) The southwestern triangle beyond is a country of broad semi-arid valleys and scattered buttes. It contains two main watersheds lying at right angles to each other: the Little Missouri, running north and south in the extreme west for 150 miles, then turning east for another hundred to join the Missouri, and those of the Cannon Ball, Heart and Knife, which flow into the Missouri from the west. The Missouri has no considerable affluent from the east within the State. At





# NORTH DAKOTA



Railroads ———  
State Capitals shown thus: ●  
County Seats shown thus: ○









## NORTH DAKOTA

the extreme west, north of the centre, the Yellowstone runs its last few miles in the State before joining the Missouri. Up and down the centre are hundreds of small lakes. In the northwest are one or two larger ones, but the one great group is northeast of the centre, its chief member being Devil's Lake (Indian, Minnewaukan), a wildly irregular body of salt water some 50 miles long by 1 to 12 wide, about 400 square miles in area, 1,467 feet above the sea, and with no visible outlet. Hurricane Lake and Lake Irwin drain into it. North and east lie the Sweetwater Lakes and Stump Lake.

**Geology and Minerals.**—The entire surface of the State has been worn by glacial action and having been afterward repeatedly submerged, is covered with the mud of extinct lakes. One of these was the vast Lake Agassiz (q.v.), larger than all the Great Lakes together, of which the Red River Valley forms a part. The southwestern triangle of the State is entirely underlaid with lignite or half-made coal (the soft coal of Germany), which is so abundant that the farmers often dig their own supplies from the hillsides. The fuel is also to be found in quantities sufficient to be of economic importance throughout the entire portion of the State which lies west of the hundredth parallel. Lignite is a free burner, and an excellent gas coal, but has been thought too light for the strong drafts of locomotives. The coal famine of 1902, however, stimulated invention, patterns in stoves have made it available and satisfactory for household purposes, and the process of briquetting promises well to remove most of the objections to it for locomotive uses. Many new mines have been recently opened, and there are now 43 in the State. The cheap power to be derived from this source is expected to make large irrigation works possible and is largely relied upon, not only by those interested in local and private irrigation but by those entrusted with the expenditure and use of the moneys, now amounting to nearly \$3,000,000, apportioned to the State as its share of the national irrigation or "reclamation fund." The production of lignite has risen from 38,997 tons in 1895, to 166,601 tons in 1900 and 296,800 tons in 1902. So also, although there is comparatively little building stone in the State, with the exception of some excellent qualities of sandstone to be found in the western portion and the granite boulders scattered throughout the glaciated area, the soil is rich in valuable clays. Not only is nearly all of the brick used in the State made within its borders, but a large and growing trade is carried on with the Canadian Northwest, and large quantities of high grade facing and fire-brick are shipped throughout the West and Northwest of the United States. Pottery clays are also to be found in great abundance, while in the neighborhood of the Tongue River in Cavalier County are to be found rich deposits of argillaceous limestone which are being made into high grade Portland and natural hydraulic cements.

**Flora and Fauna.**—The forested area of the State is very small, mainly in the Pembina, Turtle Mountain, and Devil's Lake regions, where grow oak and ash, poplar and birch, willow and box-elder, plum and bull-cherry, and other deciduous trees. Along the Missouri are large cottonwoods. The characteristic wild animals are nearly all in the southwest, where are brown bears and a few grizzlies, timber and prairie

wolves, panthers, and wildcats, besides gophers, prairie-dogs and deer. Trappers also find otter, mink, beaver, raccoon, and badger. Sportsmen shoot much grouse and prairie chicken, wild geese and wild ducks.

**Climate and Rainfall.**—The weather is severe in the winters, sometimes as low as  $-40^{\circ}$ , but the very dry atmosphere—the precipitation during the winter not averaging over five inches—makes it less trying than damper climates with higher temperatures. The summer heat rises to about  $95^{\circ}$ . Spring usually begins in March. The rainfall steadily decreases from east to west, being about 20 inches in the Red River Valley and 10 at the Yellowstone. Three fourths of it falls in the growing season, April and August. The rain is sufficient for profitable farming for 100 miles west of the Red River; beyond that, the region is better suited to ranching. Irrigation is contemplated in the arid parts, and will greatly increase their agricultural development.

**Soils and Agriculture.**—The soil is by far the richest in the Red River Valley, a wonderful bottom-land, where the black rich top soil of decayed vegetation overlies alluvium and glacial drift to the depth of sometimes 300 feet, down to a clay which when near the surface is itself rich farming ground. The soil grows thinner to the westward on the plateau, and to the southwest. The great crop of North Dakota is wheat; the No. 1 hard spring wheat of the Scotch variety, which ranks as the foremost in the market and makes the best flour. In 1902 the crop was 116,349,677 bushels, valued at \$97,791,296. Other cereals were grown in immense volume: oats, 65,787,236 bushels; barley, 26,336,755 bushels; corn, 4,999,703 bushels. The value of these four crops together was over \$133,000,000. The next most important specialty to wheat is flaxseed, of which the State raises more than all the rest of the United States together: in 1909, 10,319,062 bushels, valued at \$14,347,036. The crop of potatoes was about 5,176,938 bushels. The garden produce nearly doubled in 1901 from 1900. Small fruits and grasses also grow in abundance; but orchard fruits are not much raised. In 1909 the State had over half a million neat cattle, besides 261,917 milch cows, 289,354 sheep, and some 331,585 swine. The wool clip in 1909 was 2,457,000 pounds. The exports of hay were very large. There are still millions of acres of unappropriated land in the State, besides 8,328,490 reserved, and the farming section has a great future.

**Manufactures.**—The State being a predominantly agricultural and cattle-raising one, the only considerable manufacturing industries which are not "neighborhood" manufactures, consumed near the point of production, are those of flour, potteries, and bricks. In 1900 there were 70 flour-mills, producing a value of \$4,134,023, or 45 per cent of the total manufacturing product of the State; in 1902 there were 84. In 1902 there were eight cheese factories and 38 creameries, and 926,005 tons of feed were turned out. Fargo and Grand Forks were the chief centres of manufacture, producing over 35 per cent of the total value of products, and employing over 42 per cent of the wage-earners. There were in 1909 753 establishments, employing 3,431 hands, paying \$2,422,000 in wages, and turning out a product valued at \$19,150,000. The articles included, besides the grain products, harness and

## NORTH DAKOTA

saddlery (always important items in a ranching country), dairy products, brick and tile, pottery, fire-clay, and terra-cotta, fur and woolen goods, paper and tow, wire rope and cable and other wire work, carriages and wagons, furniture, lumber, timber, soda and mineral waters, tobacco, cigars, cement and binding-twine.

**Banking.**—All private banks have been compelled by a recent statute to take out charters as State banks. On 1 Sept., 1910, the number of national banks in operation was 149, their capital was \$5,280,750, their outstanding circulation \$3,458,788. There were also 143 state banks. The total deposits of the 176 banks (an increase of 38 within the year) were over \$10,000,000; resources, \$9,603,699.96; reserves, \$13,437,076.88; loans and discounts, \$8,482,721.64, an increase of nearly 50 per cent in the year. There were six building and loan associations, with over 2,000 members.

**Transportation Lines.**—The Missouri is navigable throughout its length in the State, but needs a clever pilot. The Red River is navigable from Fargo to the end, but boats ordinarily run only from Grand Forks. The railroad systems are three, besides small local lines: the Great Northern and the Northern Pacific cross the entire State from east to west as part of their through lines, the former mostly north of the parallel of 48°, the latter a little south of 47°, and the Minneapolis, St. Paul & Sault Ste. Marie cuts it diagonally through the centre, connecting at the Canadian boundary with a branch of the Canadian Pacific. The Chicago & St. Paul and the Chicago & Northwestern also enter the State with short branches in the south; and the Bismarck, Washburn & Grand Forks has a section from Bismarck to Washburn open 45 miles along the Missouri. There were 3,300 miles of main track in the State at the end of 1902, an increase of 219 miles in two years, and business sections are well served.

**Education.**—The schools are managed by a board of commissioners composed of the governor, the superintendent of public instruction, and the president of the State University. The public schools of the State have a land endowment valued at \$50,000,000. One eighteenth of all lands were reserved for them at the outset by the constitution; making 2,531,200 acres, besides other gifts. None of these lands may be sold at less than \$10 per acre, and the State is obligated to make good any shortages. In 1902 there were 3,262 schools and 4,319 teachers, with 103,728 enrolled pupils; the expenditures on them by the State were \$1,670,093.28. The estimated value of the public school buildings and furnishings was \$2,889,000. There were, of institutions for higher and special education, an Agricultural College at Fargo, largely supported by Congress; a State University at Grand Forks, with a School of Mines connected therewith; a State Normal School at Valley City, and another at Mayville; a School of Forestry at Bottineau, and a Scientific School at Wahpeton, all provided for by the constitution and possessing large land grants. There are nearly 100 traveling libraries in use in the system. There are about 225 periodicals and newspapers published in the State.

**Churches.**—The chief religious bodies are the Swedish and Norwegian Lutherans, with 237 societies; the Methodists, with 215; Roman

Catholics, 121; Presbyterians, 115; Congregationalists, 104; Baptists, 67; Episcopalians, 35.

**Charitable and Penal Institutions.**—There is a State Insane Hospital at Jamestown; an Asylum for the Blind at Bathgate; an Institution for the Feeble-Minded at Grafton, with a new building lately opened; a Deaf and Dumb Asylum at Devil's Lake; a Soldiers' Home at Lisbon; an Industrial School and School for Manual Training at Ellendale; a State Penitentiary at Bismarck; and a State Reform School at Mandan.

**State Government and Finances.**—The governor is elected for two years, and receives \$3,000 a year. He has a veto by items. The State officers are elected in November of the even-numbered years. The legislature is composed of a Senate to consist of 30 to 50, and a House of Representatives to consist of 50 to 140; it now has 103. It meets biennially in January of the odd-numbered years, and the sessions are limited to 60 days. The supreme court has three justices, a chief and two associates; when the State has 600,000 people it may increase the number to five. Women may vote for school offices, and may hold them. Under the new apportionment of the census, the State sends two Representatives to Congress. It has been heavily Republican since its admission, except in 1892, when the Democratic-Populist fusion barely carried it; it is so at present by nearly two to one. The Democratic platform (1896) especially favored adequate taxation of corporations, and denounced "government by injunction." The State constitution makes it a misdemeanor for any one to interfere with another's obtaining, or enjoying after having obtained, employment from any one. It also provides for the prohibition of the liquor traffic. The assessed valuation of the State for 1910 was \$278,594,193. The State, by its constitution, is limited to a 4-mill tax, but the interest on the bonded debt, school tax, etc., raises it to 7.2. The balance in the treasury on 1 Jan. 1903 was \$670,409.35; the bonded debt (1910) \$1,151,300. The income during 1902 was \$2,125,232.24. A permanent sinking fund was established during the year; the interest-bearing warrants for current expenses, which had been much overdue and shunned by investors, were taken up, and the finances of the State put on a sound footing.

**Population and Civil Divisions.**—In 1880 the population of this section of what was then Dakota Territory was 36,305, excluding Indians; in 1890, it was 174,545, or 182,719 altogether; in 1900, 319,146 altogether. During the next few years the rapid development of coal mining property and other causes of emigration so added to the population of the State that in 1910 it was 577,056. In 1900 about 311,712 were white, 286 colored, 6,968 Indians, and 180 Chinese and Japanese. The foreign-born were 113,091; but as of these 25,004 were Canadian English, 2,909 English from England, 1,800 came from Scotland, and 2,670 from Ireland, of whom probably a third, or 800 to 900, were English and Scotch from the North; there were not over 70,708 of really alien blood. Of this mass, more than half were Scandinavians,—30,206 Norwegians, 8,419 Swedes, and 3,953 Danes; 14,979 Russians; 12,677 Germans from Germany and Austria; 3,162 French Canadians; 2,670 from Ireland altogether; 1,445 Bohemians;



STATE UNIVERSITY OF NORTH DAKOTA, GRAND FORKS, N. D.

- |                                     |                |                                |                             |
|-------------------------------------|----------------|--------------------------------|-----------------------------|
| 1. Davis Hall (for Young Women).    | Power House.   | The College (for Young Women). | President's House.          |
| 2. Mechanical Engineering Building. | Main Building. | Science Hall.                  | Budge Hall (for Young Men). |





## NORTH DAKOTA AGRICULTURAL COLLEGE—NORTH PLATTE

700 Italians, and 353 Rumanians (Jews, as were nearly all the nominal Russians and some of the Germans).

The two chief places of the State are Fargo and Grand Forks, both on the Red River of the North, at the crossing respectively of the Northern Pacific and the Great Northern railroads. Fargo had 14,331 in 1910, having nearly tripled since 1890; Grand Forks had 7,652 in 1890, and 12,478 in 1910. The other towns of importance are Bismarck, the capital, 5,443, on the Missouri; Jamestown on the Dakota (James) River, and the N. P.; Valley City on the Sheyenne at the crossing of the N. P. and the M., St. P. & S. Ste. M.; Grafton on the Park west of the Red River in the north; Wahpeton on the Red River in the south; Dickinson on the Heart River in the southwest, on the Northern Pacific, and Minot in the northwest. The Indians are nearly all on four reservations: Standing Rock, on the Missouri in the southern centre; Fort Berthold, around the junction of the Little with the main Missouri; Devil's Lake, and Turtle Mountain. There are also several military posts; the largest is Fort Lincoln near Bismarck.

The State has 46 counties, as follows, with their capitals:

Adams, Hettinger.  
Barnes, Valley City.  
Benson, Minnewaukon.  
Billings, Medora.  
Bottineau, Bottineau.  
Bowman, Bowman.  
Burleigh, Bismarck.  
Cass, Fargo.  
Cavalier, Langdon.  
Dickey, Ellendale.  
Dunn, Manning.  
Eddy, New Rockford.  
Emmons, Williamsport.  
Foster, Carrington.  
Grand Forks, Grand Forks.  
Griggs, Cooperstown.  
Hettinger, Mott.  
Kidder, Steele.  
Lamoure, Lamoure.  
Logan, Napoleon.  
McHenry, Towner.  
McKenzie, Schafer.  
McIntosh, Ashley.

McLean, Washburn.  
Mercer, Stanton.  
Morton, Mandan.  
Mountrail, Stanley.  
Nelson, Lakota.  
Oliver, Sanger.  
Pembina, Pembina.  
Pierce, Rugby.  
Ramsey, Devil's Lake.  
Ransom, Lisbon.  
Richland, Wahpeton.  
Rolette, Rolla.  
Sargent, Forman.  
Sheridan, McClusky.  
Stark, Dickinson.  
Steele, Sherbrooke.  
Stutsman, Jamestown.  
Towner, Cando.  
Traill, Hillsboro.  
Walsh, Grafton.  
Ward, Minot.  
Wells, Essenden.  
Williams, Williston.

1876 it was proposed to set off the northern part as the Territory of Pembina, but political antagonisms had arisen, and the population of the Territory had increased to half a million before final action was taken dividing it into two States. The great Scandinavian immigration began about 1885. The State was admitted into the Union 2 Nov. 1889.

ANDREW A. BRUCE,  
*Associate Dean University of North Dakota.*

**North Dakota Agricultural College**, opened in 1891, at Fargo. The regular four years' courses include agriculture, general science, and mechanical engineering; the shorter courses are agriculture and steam engineering, two years, and a "farm school" of three months; there are also courses in domestic science and military science. The college is open to women, and there are women on the faculty. The campus includes 640 acres; a new sewerage system connecting all buildings and grounds with the main sewer of Fargo was completed in 1901. The income, is derived mainly from State and Federal appropriations. The college organizes farmers' institutes in all parts of the State, under the supervision of the faculty; in 1910 18 such institutes were held, with an attendance of over 7,000. The faculty in 1910 numbered 85, and the students 1190, of whom about 400 were women.

**North Dakota, State University of.** The State University and School of Mines of North Dakota is located at Grand Forks. It was established by an act of the Territorial Legislature approved 27 Feb. 1883. The following colleges or departments have thus far been organized: The College of Law, granting the degree of LL.B.; The College of Liberal Arts, granting the degrees of B. A. and M. A.; The College of Mechanical and Electrical Engineering, granting the degrees of M. E. and B. E.; The College of Mining Engineering, granting the degree of E. M.; The Normal College; the School of Commerce; and the School of Pharmacy. The plant of the University consists of eight substantial buildings heated by steam and lighted by electricity. The University has received as a grant from the Federal Government 126,080 acres of land which, under the terms of the grant and of the state constitution, may not be sold for less than \$10 an acre. It is probable that this grant will eventually yield a fund of not less than \$2,000,000. The University is maintained by an annual fixed appropriation of two-fifths of a mill on the dollar of the assessed valuation of the State for purposes of taxation. The total income of the University for the current year is approximately \$100,000. The University owns, exclusive of its lands, property valued at \$500,000. Its library numbers 30,000 volumes. E. J. BABCOCK.

*State University of North Dakota.*

**North Downs.** See DOWNS.

**North Foreland, förland.** See FORELAND, NORTH AND SOUTH.

**North German Confederation**, the union of German states in 1866 under the leadership of Prussia. See GERMANY.

**North Island.** See NEW ZEALAND.

**North Platte**, plätt, Neb., city, county-seat of Lincoln County; at the confluence of the North and South Platte rivers, and on the

**History.**—The old Territory of Dakota took its name, as did its river, from the Dakotas ("allies"), another name for the Sioux confederation. It formed a part of the Louisiana Purchase (q.v.) and when Lewis and Clark (see LEWIS AND CLARK'S EXPEDITION), were sent to explore the region in 1804, they wintered in the Mandan camps and were at the mouth of the Yellowstone in the spring. Lord Selkirk built a fort at Pembina in 1810, supposing it a part of his purchase from the Hudson's Bay Company. The first steamer ascended the Missouri in 1830. Frémont in his explorations penetrated to Devil's Lake in 1839. In 1832 George Catlin was here, and painted some of his famous Indian portraits. The first purchases of land from the Sioux were made in 1851. In 1857 the first settlement in Dakota was made at Sioux Falls, in South Dakota. When Minnesota was organized as a Territory in 1849, a portion of this district was assigned it. The Territory of Dakota was organized in 1861, and included Montana and parts of Wyoming and Idaho. The limits of the present North and South Dakota were fixed in 1868. Settlement was long checked by Indian wars, and the shelter taken here by the Sioux tribes expelled from Minnesota after the bloody outrages committed during the Civil War. In

## NORTH POLE—NORTHAMPTON

Union Pacific railroad; about 220 miles in direct line west of Lincoln, the capital of the State. It is in a productive agricultural region where irrigation has been introduced, and in which there is a large acreage of alfalfa, sugar beets, corn, and wheat. Considerable attention is given to stock-raising. The railroad machine shops here employ several hundred men. It has grain elevators, a cold storage plant, stock yards, brick, coal, and lumber yards. It is the seat of a United States land office. The Y. M. C. A. library has about 2,200 volumes. Pop. (1890) 3,055; (1900) 3,640; (1910 est.) 4,000.

**North Pole.** See ARCTIC REGIONS; POLAR RESEARCH.

**North River,** the name given to the lower course of the Hudson River. This name was applied in the early days when the Delaware was called the South River. See HUDSON RIVER.

**North Sea,** or **German Ocean,** a northeastern extension of the Atlantic Ocean lying between Great Britain and the continent of Europe; lat.  $51^{\circ}$  to  $61^{\circ}$  N.; lon.  $2^{\circ}$   $30'$  W. to  $7^{\circ}$   $30'$  E.; Great Britain with the Orkney and Shetland islands being on the west; Denmark and part of Norway on the east; Strait of Dover, part of France, Belgium, Holland, and Germany on the south; and the Arctic Ocean on the north. Extreme length, from the Strait of Dover to Unst, the most northern of the Shetland Isles, about 700 miles; greatest breadth, between Haddingtonshire, Scotland, and Denmark, about 420 miles; area, over 140,000 square miles. The shores of all the countries that surround the North Sea are deeply indented with bays, fiords, inlets, and large estuaries; but its most remarkable arm is the Skager Rack, between Denmark and Norway, which communicates through the Kattegat with the Baltic Sea. The North Sea is deepest on the Norwegian side, where the soundings give 190 fathoms; but the mean depth of the whole basin may be stated at no more than 31 fathoms. The bed of this sea is traversed by several enormous banks, one of which trends from the Firth of Forth, Scotland, in a northeasterly direction, to a distance of 110 miles; others run from Denmark and Jutland upward of 105 miles to the northwest; while the greatest of all, the Dogger Bank, occupies the centre of the sea, from lat.  $54^{\circ}$   $10'$  to  $57^{\circ}$   $24'$  N. and lon.  $1^{\circ}$  to  $6^{\circ}$   $7'$  E. The great oceanic tidal wave which originates in the Atlantic, after having swept the west coasts of Great Britain and Ireland, enters the northern extremity of the North Sea, giving high water nearly simultaneously to the opposite shores of Scotland and Norway. Pursuing its course along the coasts of the former and of England, it rules the tides as far south as the Thames, making the tour of Great Britain in 18 hours. On entering the North Sea, on the north of Scotland, the tidal wave does not exceed 12 feet; but gradually increases to 14, 16, 18, and in the Humber to 20 feet; a difference of height depending on the figure of the shore, the form of the bottom, and the direction of incidence of the wave. The fisheries are extensive, especially on the Dogger Bank, on all the shores that bound it, and in the direction of the Orkney and Shetland Isles. The North Sea has been from the earliest times one of the most important highways of the world.

**North Sea and Baltic,** or **Kaiser Wilhelm, Canal.** See CANALS.

**North Sea Canal,** or **Amsterdam Canal.** See CANALS.

**North Star,** in astronomy, the north polar star, of the constellation Ursa Minor, also called Polaris. See URSA MAJOR.

**North Star, Order of.** See ORDERS AND DECORATIONS.

**North Sydney,** Canada, town and port of entry, Cape Breton Island and County, Province of Nova Scotia, on the northern side of Sydney Harbor, five miles north northwest of Sydney; and on the Intercolonial and the Nova Scotia Steel and Coal Company's R.R.'s. Coal is mined in large quantities and there are large shipping interests beside some smaller manufactures. It is the general shipping point for farm products and general merchandise going into Newfoundland. Religious services are held in five church edifices. There are two banks. Besides the public schools, Saint Joseph's Academy (Catholic) is located there. The town was first settled in 1792 by Loyalists and became incorporated in 1885. Its government consists of a mayor elected yearly and a council of eight members elected for two years. The population is mainly English, Scotch, and Irish. Pop. (1901) 4,646; (1910) about 5,000.

**North Tonawanda,** tŏn-ā-wŏn'dā, N. Y., city in Niagara County, at the confluence of Niagara River and Tonawanda Creek, on the Erie Canal, and on the New York C. & H. R., the Erie, and the Lehigh V. R.R.'s; opposite Tonawanda, and 10 miles above Buffalo. Several other railroads, using leased tracks, and electric lines connect the city with Buffalo, Niagara Falls, and other places. North Tonawanda is in an agricultural region, but the city is noted for its manufacturing and commercial interests. It has large lumber yards, and the chief manufactures are steam pumps, merry-go-rounds, pig iron, bolts, nuts, steam piping, and a variety of lumber products. The public library has about 6,000 volumes. The charter of 1897 provides that the government shall be vested in a mayor, who holds office two years, and a council consisting of two members from each ward, and three at large. The city owns and operates the waterworks. Pop. (1910) 11,955.

**Northampton,** nŏrth-āmp'tŏn, England, a city, capital of the county of same name, 66 miles northwest of London, on the left bank of the Nen, and on the London and Northwestern, and Midland R.R.'s. The principal buildings are the town hall; the shire or county hall, the county and borough jails, corn exchange, barracks, infirmary, theatre, etc. There are a free library, museum, schools of science and art, grammar school, mechanics' institute, an Athenæum, and other literary and artistic societies. The benevolent institutions include the infirmary, a lunatic asylum, the Royal Victoria Dispensary, St. John's and Thomas-à-Becket hospitals, etc. The principal churches are All Saints', rebuilt in 1680, St. Peter's, restored in 1850; St. Giles', St. Sepulchre's, dating from the 12th century, and the Roman Catholic cathedral. The staple manufacture is boots and shoes for home and export trade, which employs about 12,000 hands. The curing of leather is also carried on on a large scale. The races, held on a race course, north of the

## NORTHAMPTON — NORTHEAST BOUNDARY DISPUTE

town, attract great numbers of visitors. Besides two weekly markets there are 11 annual fairs. Pop. about 90,000.

**Northampton**, Mass., city, county-seat of Hampshire County; on the Connecticut River, and on the New York, N. H. & H. and the Boston & M. R.R.'s; 18 miles north of Springfield, 109 miles west of Boston, and about 140 miles from New York city. The largest part of the city is known as the "Center," and the remainder includes the villages of Bay State, Florence, and Leeds. Nearby are Mount Holyoke and Mount Tom, both with electric railroads to the summit. The city is on a height which commands a fine view of the river valley. It was settled 14 May 1654 by English colonists, and was named after Northampton in England. Jonathan Edwards (q.v.) lived here for some years. It was incorporated on 18 October of the same year, and chartered as a city 1 Jan. 1884. It is in a productive agricultural section, but it has extensive manufacturing and commercial interests. The chief manufacturing establishments are sewing-silk mills, basket and paper box factories, lumber mills, brush factory, hardware works, hosiery mills, sewing machine and furniture factories, machine shops, pulp mills, emery wheel works, and foundries. There are about 3,000 employees in the manufactories. The trade is principally in the manufactured articles and farm products. It has a number of fine buildings and prominent institutions, among which are the Dickinson Hospital, the State Asylum for the Insane (1903, 700 patients), and the opera house. The last mentioned, a gift from a native of the city, is owned and managed by the municipality. There are a number of fine church buildings. The educational institutions are Smith College (q.v.); the Burnham Classical School for Girls; the Clarke Institute for Deaf Mutes, endowed by John Clarke; public and parish schools; three public libraries, gifts of natives of Northampton, and the "Home Culture Club," founded by George W. Cable (q.v.), and assisted by a gift of \$50,000 from Andrew Carnegie. The educational advantages of this club have been of great benefit to a large number of men and women; unique features are the instructions in household arts and amusements. The three national banks have a combined capital of \$650,000, and the three savings banks have a total deposit of \$4,975,000. The "Smith Charities" has peculiar features that make it a most remarkable and beneficent institution. It was founded by the will of a public benefactor, who desired to aid a special class of worthy persons. On certain conditions young men and women and widows receive annual gifts of money, young women receive gifts when they marry, and young men, who learn a trade, receive a certain sum of money when they attain the age of 21. The charter of 1883 provides for a board of aldermen and a council of 21 members elected annually by the people. The board of education and the trustees of the Forbes Library are chosen by popular vote. The city owns and operates the waterworks. Pop. (1864) 18,643; (1910) 19,431. Consult Trumbull, 'History of Northampton.'

JAMES H. HUNTINGTON,

*Editorial Staff, 'Daily Hampshire Gazette.'*

**Northbridge**, Mass., town in Worcester County; on the Mumford and the Blackstone rivers, and on the New York, N. H. & H. railroad; about 10 miles southeast of Worcester. It was settled in 1662 and remained a part of Mendon until 1772 when it was incorporated as a separate town. Its chief manufacturing establishments are large cotton and woolen mills, machine shops, furniture and cigar factories. The government is administered by annual town meetings. Pop. (1910) 8,807.

**Northbrook**, Baron. See **BARING**, THOMAS GEORGE.

**Northcote**, north'kôt, James, English artist: b. Plymouth, England, 22 Oct. 1746; d. London 13 July 1831. He early showed a taste for drawing and was encouraged to go to London, where he arrived (1771) with a letter of introduction to Sir Joshua Reynolds, under whom he worked for five years. He visited Italy in 1777 where he spent his time in copying the old masters, especially Titian. He returned to London in 1780, and six years later exhibited his first historical work, 'The Young Princes Murdered in the Tower.' Between 1783 and 1831 he exhibited no less than 229 historical paintings, taking subjects from English history or Shakespeare; these are chiefly remarkable for highly effective composition. The faces are Greek, the costumes absurd, the chiaroscuro fantastic and exaggerated, and the coloring inharmonious. His greatest skill is shown as an animal painter. His portraits are uneven, but those of men are better than those of women, while some of his children's and angels' faces are beautiful. This will be seen from his 'Portrait of Sir Simon Taylor'; 'A Dog and a Hawk'; 'Prince Arthur and Hubert'; 'Four Infant Angels in the Clouds.'

**Northcote**, Sir Stafford Henry, 1ST EARL OF IDDESLEIGH, English statesman: b. London 27 Oct. 1818; d. there 12 Jan. 1887. He was educated at Eton and at Balliol College, Oxford, became private secretary to Gladstone in 1843; was called to the bar in 1847, and in 1851 succeeded his grandfather in the baronetcy. He sat in Parliament in 1855 for Dudley, in 1858 was elected member for Stamford, and in 1866 for North Devon, which he represented till 1885. In 1862 he published 'Twenty Years of Financial Policy.' In 1866 he became president of the Board of Trade; in 1867-8 was secretary for India; in 1871 a member of the high joint commission, which arranged the Treaty of Washington; and in 1874-80 was chancellor of the exchequer in the cabinet of Disraeli. After the Liberals returned to power in 1880 he became Conservative leader in the Commons, and in 1885 he was raised to the peerage, and appointed first lord of the treasury. Consult his published 'Letters and Essays' (1887); Lang, 'Life, Letters, and Diaries of Stafford Northcote' (1890).

**Northeast Boundary Dispute**, the disagreement between the United States and Great Britain from 1783 to 1842 respecting the northeast frontier. The Treaty of 1783 defined the northeast boundary of the United States, toward Canada, as extending from the source of the St. Croix due north to the highlands or watershed between the Atlantic and St. Lawrence systems, thence along those highlands to the northwesternmost head of the Connecticut River.

## NORTHEAST CAPE—NORTHROP

**Disputes** arising over this definition, in 1831 the King of the Netherlands, as arbitrator, made an award which neither party was willing to accept. Finally, by the Webster-Ashburton Treaty of 1842, the present line was agreed upon, not greatly differing from that suggested by the Dutch king, and giving about seven twelfths of the disputed territory to the United States and about five twelfths to Great Britain. See **BOUNDARIES, AMERICAN**.

**Northeast Cape.** See **CHELYUSKIN CAPE**.

**Northeast Passage.** See **ARCTIC REGIONS; POLAR RESEARCH**.

**Northen, nōr'tēn, Adolph,** German painter: b. Münden, Prussia, 6 Nov. 1828; d. Düsseldorf 28 May 1876. He was a pupil in the Düsseldorf Academy from 1847 to 1851, when he devoted himself to the delineation of soldier life and battle scenes. In 1852 he began a series of pictures illustrating the wars of Napoleon I. These included 'The Battle of Belle Alliance' (1860); and 'The Retreat of the Grand Army.' To these he added scenes from the war with Denmark, and from the German-Austrian war 1866. His series portraying the last Franco-Prussian war includes 'The Storming of Weinberg'; 'The Transport of French Prisoners'; and 'The Charge of the 16th Uhlans on a Square.'

**Nor'ther.** See **COLD WAVE**.

**Northern Bear,** in international politics, a name often applied to Russia.

**Northern Drift,** in geology, an obsolete name for the boulder-clay of the Pleistocene Period. The deposits were popularly supposed to have been brought by the polar currents from the far North.

**Northern Giant,** a name frequently applied in Europe to Russia, alluding to its size, growth, and population.

**Northern Illinois College,** a coeducational institution, in Fulton, Ill.; founded in 1861, opened in 1865; it last reported: professors and instructors, 12; students, 220; volumes in the library, 1,000; value of grounds, buildings, and scientific apparatus, \$110,000; total income, \$8,000. The departments are preparatory, collegiate, and the summer school. The courses lead to the degrees of A.B., B.S., Ph.B., and B.L. There is no endowment fund.

**Northern Lights.** See **AURORA BOREALIS**.

**Northern Mythology.** See **MYTHOLOGY**.

**Northern Territory.** See **SOUTH AUSTRALIA**.

**Northfield, Mass.,** town in Franklin County; on the Central Vermont railroad; about 12 miles northeast of Greenfield, and 30 miles northwest of Fitchburg. It is famous as a centre of religious training. It is the birthplace of Dwight L. Moody (q.v.) and was his home and the scene of much of his work. The annual conferences of Christian workers and of students are held, in summer, in Northfield. The town is the seat of the Northfield Training School and of the Northfield Seminary for young women. The Mount Hermon School for Boys, in the adjacent town of Gill, is connected with the Northfield educational work. The town is in an agricultural region and its industries are connected with farm products. The govern-

ment is administered by town meetings. Pop. (1910) 1,642.

**Northfield, Minn.,** city in Rice County; on the Cannon River, and on the Chicago G. W. and the Chicago, M. & St. P. R.R.'s; about 40 miles south by west of Saint Paul. It was settled in 1856 and in 1875 was chartered as a city. It is in a fertile agricultural section in which wheat is one of the principal crops. The chief manufactures are knit goods, dairy products, flour, and brick. It has considerable trade in grains and live stock. It is the seat of Saint Olaf College, opened in 1875 under the auspices of the Lutheran Church, and of Carleton College, opened in 1870 by Congregationalists. Other educational institutions are the Scoville Library, the Goodsell Observatory, and the public schools. It has the Odd Fellows' Orphans' and Widows' Asylum, a Y. M. C. A. building, and several fine churches. The city owns and operates the waterworks. Pop. (1890) 2,659; (1900) 3,210; (1910) 1,918.

**Northfield, Vt.,** village in Washington County; on the Dog River, and on the Central Vermont railroad; about nine miles south by west of Montpelier. It is in a valley surrounded by low hills and mountains, Bald and Paine mountains are near. In the vicinity are black slate and granite quarries. The chief industries are connected with the quarrying of granite and slate, and with farm and dairy products. It has flour and lumber mills and woolen factories. It is the seat of the Norwich University, opened in 1834. The village owns and operates the electric light plant. Pop. (1890) 1,222; (1900) 1,508; (1910) 3,226.

**Northington, nōr'thing-tōn, Robert Henley, 1ST EARL OF,** English statesman: b. about 1708; d. Grange, England, 14 Jan. 1772. He was educated at Oxford; in 1733 was called to the bar, and in 1747-57 sat in Parliament for Bath. In 1756 he was appointed attorney-general, and in the next year became lord keeper of the great seal and took his seat as speaker of the House of Lords over which he presided for three years. In 1761 he was made lord chancellor, and owing to ill-health resigned in 1767.

**North'men.** See **NORMANS**.

**Northrop, nōr'thrūp, Birdsey Grant,** American educator and clergyman: b. Kent, Conn., 18 July 1817; d. Clinton, Conn., 27 April 1898. He was graduated at Yale in 1841; and from its divinity school in 1845; and was subsequently a pastor of a Congregational Church at Saxonville, Mass., for 10 years. He was agent of the Massachusetts State Board of Education 1857-67 and secretary of the Board of Education of Connecticut 1857-67. He introduced the observance of Arbor Day in schools, and was considered as the "father of Village Improvement Societies." In 1872 he was invited by the Japanese government to establish a system of public education in Japan. Although he declined the honor he rendered such valuable service to that country that he was received as the guest of the Japanese nation.

**Northrop, Cyrus,** American educator: b. Ridgefield, Conn., 30 Sept. 1834. He was graduated from Yale in 1857, from its law school in 1859, and was admitted to the bar in 1860. He was clerk of the Connecticut House of Rep-

## NORTHROP—NORTHWEST FRONTIER PROVINCE

representatives in 1862 and of its Senate in 1863. He became editor of the New Haven 'Palladium' in 1863 and in 1863-84 was professor of rhetoric and English literature at Yale. From 1869-81 he was collector of the port of New Haven; president University of Minnesota 1884-1908 when he resigned.

**Northrop, Harry Pinckney**, American Roman Catholic bishop: b. Charleston, S. C., 5 May 1842. He was graduated from Mount Saint Mary's College, Emmitsburg, Md., in 1860, studied four years in the theological seminary there and at the American College in Rome, and was ordained to the priesthood in 1865. He held several pastorates in his native city and elsewhere, and was consecrated bishop in 1882 as vicar apostolic of North Carolina, and titular bishop of Rosalia. In 1883 he was transferred by papal brief to the see of Charleston.

**Northumberland, nôr-thûm'bêr-land, John Dudley, DUKE OF**, English statesman: b. England 1502; d. London 22 Aug. 1553. During the war with France 1544-5 he commanded the English squadron, and later was one of the executors of the will of Henry VIII. He schemed against Somerset, the Protector, and in 1550 was the dominant influence in the council. The next year he was created Duke of Northumberland, lord high steward, and earl marshal. His fourth son, Lord Guilford Dudley, married Lady Jane Grey in May 1553, and the duke persuaded Edward VI. to name her as his successor. Through Northumberland's influence she was placed on the throne 10 July, but on the 22d of August following he was executed for high treason.

**Northumberland, Robert de Mowbray, EARL OF**, English warrior: d. about 1125. He was a son of Roger de Montbrai, a follower of William the Conqueror, and was made Earl of Northumberland some time not far from 1080. He was constantly engaged in feudal quarrels in the course of which he burned Bath and ravaged Wiltshire, and when Malcom, king of Scots, invaded the country for a second time in 1093 he was met and slain by Mowbray at Alnwick. He raised an insurrection in 1095 and endeavored to wrest from the Conqueror's sons the crown and give it to their cousin, Count Stephen of Aumâle. At first successful he was finally forced to retreat to his great castle of Bamborough where, after a stout resistance, he was finally taken, and though reports conflict, it is reasonably certain that the remaining 30 or more years of his life were spent in prison. He founded the priory at Tynemouth.

**Northumberland, Earls of.** See PERCY.

**Northumberland, England**, a maritime county bordering on Scotland and on the North Sea; area 2,015 square miles. The county-seat is Newcastle-upon-Tyne, and other large towns are Wallsend and Tynemouth. The surface is diversified with hill, moorland, and valley, and its principal river is the Tyne. Coal mining and its supplemental industries place Northumberland high among the most productive counties of England.

**Northumbria, England**, an ancient Anglo-Saxon kingdom, one of the Heptarchy, which extended from the Humber to the Forth, and was bounded on the west by the kingdoms of

Strathclyde and Cumbria. The kingdom was founded by Ida, an Anglian chief, who invaded the country in 547. On the death of Ida in 560 part of it was incorporated in the kingdom of Deira, which occupied also what is now Yorkshire. Bernicia and Deira were united under Ethelfrith in 593. In 792 it was ravaged by the Danes, and again in 844 and 867, when they permanently settled in the country. Halfdene became sovereign, and portioned out the land among his followers. In the treaty which Alfred made with the invaders Northumbria was included in the Danelagh. Against Alfred's successors the Danes carried on a series of petty wars, till the dissolution of the kingdom of Northumbria in 950. It was then divided into the three earldoms or counties of Bernicia, Deira, and Lothian.

**Northwest Boundary Dispute**, the disagreement between the United States and Great Britain from 1814 to 1846, respecting the northwest frontier. The territory bounded north by latitude 54° 40', east by the Rocky Mountains, south by latitude 42°, and west by the Pacific Ocean had been claimed at various times and to various extents by Russia, Spain, Great Britain, and the United States. The Russian claim, which rested mainly upon occupation by fur traders, was settled by a treaty 11 Jan. 1825. Under this treaty the United States were to make no settlements north of latitude 54° 40', and Russia none south of that latitude. Great Britain and Russia agreed upon the same terms. The Spanish claims were confined south of latitude 42° by the treaty which ceded Florida in 1819. Great Britain had little or no claim by discovery. The United States' claim rested upon the voyage of Gray up the Columbia River in 1792 and the explorations of Lewis and Clark through the Rocky Mountains and through the Oregon country in 1805-6, under the orders of Jefferson. By the treaty of 20 Oct. 1818 the whole territory west of the Rocky Mountains was to be opened to both countries for 10 years, and, in 1827 the joint occupation for an indefinite period was agreed upon. Later this produced dissatisfaction, and after considerable negotiation, Great Britain was induced in 1846 to accept latitude 49° as the boundary from the Rocky Mountains to the channel between Vancouver's Island and the mainland. See BOUNDARIES, AMERICAN; ALASKAN BOUNDARY COMMISSION.

**Northwest Company, The**, an organization of French-Canadian traders who, in the 18th century, entered the fur trade as a rival of the Hudson's Bay Company, which had enjoyed a monopoly for 200 years. In 1805 the Northwest Company established trading posts on the Pacific coast and in 1813 absorbed the Pacific Fur Company, established by John Jacob Astor. In 1821 the Northwest Company consolidated with the Hudson's Bay Company. See FUR TRADE, THE.

**Northwest Frontier Province, India.** A new political and administrative province of British India, constituted 7 Nov. 1901, out of the province of the Punjab, consisting of portions of the district of Hazara, and the Trans-Indus districts of Peshawar, Kohat, Bannu, and Dera Ismail Khan, with the political charges of the mountain regions of



## NORTHWEST PASSAGE—NORTHWEST PROVINCES

Kurram, Malakand (including Dir, Swat, and Chitral), Khybar, Tochi, Gomal, and Shirani. These mountain regions came under the suzerainty of the British Government during the recent Afghan Wars, and were designated by Lord Beaconsfield, "the scientific frontier of India." Up to that date, these mountain tribes nominally acknowledged the Amir of Kabul, and consequently regarded themselves as altogether independent of the British Government. It was this effort, on the part of the conservative administration of Great Britain, to separate these tribes from the quasi-authority of the Amir, and to bring them under the power of Great Britain, that was so strenuously resisted by the late Sher Ali Khan of Kabul, in January 1877, and which led to the Afghan War of 1878.

These mountain tribes are Afghans, speaking Pushto, the language of the Afghans, and are made up of a people trained to the use of arms from their youth. The annexation of these tribes to British India was, therefore, a most important event in the history of Hindustan. According to a report by Sir Lepel Griffin, the fighting power of these tribes is estimated as follows: Adjoining the Hazara district, Akazais 1,000, Hallsanzais 1,700; adjoining the Peshawar valley, Jadrans 2,500, Wazeerwals 2,000, Swatis 6,000, Utmankhels 5,000, Momunds 16,000; adjoining Peshawar and Kohat, Afreedis 23,500; adjoining Kohat, Bannu and Dera Ismail Khan, Orukzais 29,500, Saimooshts 4,500, Turis 5,000, Wazeeris 44,000; adjoining Dera Ismail Khan, Shoornes 5,000, Ustranas 900, Kusranis 1,500. These tribes, numbering more than 114,000 fighting men, are Afghans by birth and nationality, and Moslems of the Sunni sect, and they were consequently a constant menace to the peace of the Northwest frontier of India until they were brought under the control of the British Government.

This newly-formed province comprises an area of 16,466 square miles, with a population, mainly Mohammedans, of 2,125,480. The capital of the province is the ancient city of Peshawar, with a population of nearly 100,000. It is here that the chief commissioner of the province resides. There are deputy commissioners at Peshawar, Abbotabad, Kohat, and Dera Ismail Khan. Outside the native city of Peshawar there is a large military cantonment under a major-general commanding the "Frontier Force," with outlying stations of English and native troops at Nowshera; the corps of Guides at Murdan; native troops at Kohat, Bannu (or Edwardesabad), Dera Ismail Khan, and Abbotabad. At Cherat, on the Khattak hills, between Peshawar and Kohat, there is a sanitarium occupied by British troops during the hot season. A military force of Afreedis tribes, under the command of a British officer, has been organized in the Khyber Pass, and there are forts at Jamrud, Alimusjid, and Lundi Kotal, commanding the Pass which is the highway to Kabul. The city of Kabul is 190 miles from Peshawar.

There is railway communication from India to Peshawar, crossing the river Indus at Attok, and running to the entrance of the Khyber Pass. There is also a railroad to Kohat, and to Dera Ismail Khan.

The Peshawar valley is watered by the Kabul River, which empties itself into the Indus at Attok; and the Derajat Valley is drained by the Kurram, and the Gambila rivers. On the left bank of the Kabul River is the district of Yusufzai, inhabited by an Afghan people speaking the Afghan language. The ancient fords crossing and commanding the River Indus and entering the Peshawar Valley, are at Attok, Hund, and Torbeyla. It is supposed that Alexander the Great crossed with his army at Hund, 331 B. C. Nearly all the invading armies of Northern India have passed through the Peshawar valley, hence the importance of this section of country. It was here that the Hon. Mountstuart Elphinstone held a political conference with Shah Shujah, the King of Kabul, in 1808. It was here that Sir John Lawrence signed a treaty with Sardar Gholam Hydar Khan, son of Dost Mohammed, Amir of Kabul, January 1857, and which is said to have kept the Afghans faithful to British interests during the Indian Mutiny which broke out at Meerut the May following. It was here that the political conference was held in January 1877, between Sir Lewis Pelly, K. C. B., representing the British Government, and Nur Mohammad Shah, representing the Amir of Kabul, which resulted in the British advance on Afghanistan the following year.

As a literary centre Peshawar claims to be the birthplace of the two popular Afghan poets who were contemporaries at the close of the seventeenth century: Abdur Rahman, whose grave is still to be seen in the village of Hazarkhana, near Peshawar, and Khushhal Khan Khuttuk, who died in 1691, and who is buried near Akora on the right bank of the Kabul River.

Throughout the Peshawar valley there are interesting and important Buddhist remains. The most notable of these are at Takh-i-Bhai, a short distance from Murdan, and the Girkhatra in the centre of the City of Peshawar. The valley is said to have been frequently visited by Gautama, the founder of Buddhism. It is notoriously unhealthy, and is designated by the British soldier "the valley of death." The temperature ranges from a minimum of 17° in February to a maximum of 137° in July. The average rainfall is about 14 inches.

The principal agricultural products of the province are wheat, millet, jawar, cotton, rice, and indigo. The Peshawar valley is specially celebrated for its rice. The poppy plant is extensively grown in the Darajat. The cultivation of the land mainly depends upon artificial irrigation.

The chief towns of the province are Peshawar, Kohat, Dera Ismail Khan, Bannu (Edwardesabad), Abbotabad, Hurripur, Tank, and Kolachi.

THOMAS P. HUGHES,  
*Author of 'The Dictionary of Islam.'*

**Northwest Passage.** See ARCTIC REGIONS; POLAR RESEARCHES.

**Northwest Provinces, India,** until 1901, the designation of a political division now THE UNITED PROVINCES OF AGRA AND OUDH. It is situated in the north central part of India, bounded on the north by Tibet and Nepal, on the

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east by Bengal, on the south by the states of the Central India Agency, and on the west by the Rajputana and the Punjab. It consists of Agra, 83,198 square miles; Oudh, 23,966 square miles; and the native states of Rampur, 899 square miles; and Garhwal, 4,180 square miles. Population Agra, 34,858,705; Oudh, 12,833,077; Rampur, 533,212; Garhwal, 268,885.

**Northwest Territories, Canada,** the political division comprising the territories of Assiniboia, Alberta, Saskatchewan, Athabasca, Mackenzie, Ungava, Franklin, Keewatin, and the Yukon Territory. The political division has an area of 2,634,880 square miles. (See CANADA: THE CANADIAN WEST; THE SETTLEMENT OF THE CANADIAN WEST; THE HUDSON'S BAY COMPANY; GEOGRAPHY.) This immense district (excluding Labrador) was known as the Hudson Bay Territory up till 1870, when the Hudson's Bay Company surrendered it to Canada for the sum of £300,000. The territories are governed by a lieutenant-governor and executive council, and a legislative assembly. Regina is the seat of government. The climate generally is of an Arctic character with long and rigorous winters, and short summers; the agricultural capabilities of a part of this region to the south, however, are very great. The fertile belt of the Saskatchewan alone contains an area of 64,000 square miles in one continuous strip of 800 miles long, with an average breadth of 80 miles. But the best and largest wheat area is beyond the Saskatchewan, in the valleys of the Athabasca and Peace rivers, and extending through the Peace River Pass to the western slope of the Rocky Mountains, and north to lat. 60° N. The lakes and rivers west of Lake Superior are bordered by rich prairies and luxuriant woods. Coal is abundant and is now worked; petroleum is plentiful; copper, silver, iron, salt, and gold have been found, the last especially on the Klondike River in the Yukon district. Great quantities of furs are obtained. The Canadian Pacific Railway crosses the southern part of this territory, and there are several other railways made or to be made. In the towns and villages springing up along the lines of railway free schools are established, and in the Rocky Mountain region five tracts of land have been reserved as national parks. Population about 115,000. See CANADA, NORTHWEST TERRITORIES OF.

**Northwest Territory,** the name given by the Continental Congress of America, in 1787, to a region east of the Mississippi, north of the Ohio, south and west of the Great Lakes, and west of Pennsylvania. The greater part of this territory belonged to France prior to 1763, when, by treaty, Great Britain became possessor of all the domain east of the Mississippi, in North America, which had been claimed by France. The territory west of the Alleghany Mountains and north of the Ohio River was, in 1774, annexed to the Province of Quebec. By the treaty of peace with Great Britain, at the close of the Revolutionary War, in 1783, this region was ceded to the United States. Its area was about 265,878 square miles, and it bordered on all the great interior waterways of North America which had then been explored; the Saint Lawrence River because a part of the Great Lakes not excluded. The exact status

of this territory was a subject of dispute for several years, on account of the conflicting claims of ownership of New York, Virginia, Connecticut, and Massachusetts. The States mentioned cited in support of their claims various early grants from the Crown, and conquests of Indian tribes. The original Colonial charter usually gave definite north, east, and south boundaries, but that of the west was often the sea, the South Sea, the ocean, etc., which was interpreted as Pacific Ocean. The other States of the Union refused to recognize the claims based on charters and acts as cited, but held that the lands in question should belong to the whole Union and should be administered for the common good. Congress in session, in 1780, gave a pledge to the Union that if the States claiming this western territory should cede it to the Confederation it should be used for the good of all the States, and should, in due time and under proper conditions, be admitted as States of the Union, with equal rights and privileges with the original States. New York was the first to cede her claims, in 1781; three years later Virginia ceded her claims, except a section north of the Ohio River (now the southern part of the State of Ohio) called for sometime the "Virginia Military District." In 1785 Massachusetts gave up her claims, and in 1786 Connecticut ceded all except a strip extending from the Pennsylvania boundary westward 120 miles, comprising about 6,000 square miles and called the "Western Reserve" (q.v.). Connecticut retained jurisdiction over this territory until 1800. A tract of 500,000 acres, in the western part of the "Western Reserve," was donated by Connecticut as "Fire Lands" to be divided as directed among such of its citizens as had been damaged by incursions of the British troops during the Revolutionary War. On 13 July 1787 the "Northwest Territory" was established by the Continental Congress. The ordinance was prepared by the chairman of the committee, Nathan Dane of Massachusetts. This ordinance provided for the enactment of certain rules deemed necessary for the public good, the chief provisions of which were (1) that not less than three nor more than five States should be formed out of the "Northwest Territory"; (2) that slavery should be prohibited forever within its borders; (3) that religious freedom should be wholly and entirely established and maintained; (4) that schools and means of education should be forever encouraged; (5) that the writ of habeas corpus and trial by jury should be guaranteed to all its inhabitants. A form of government was provided for and the territory was divided. It was further provided that when any one of the divisions had a population of 60,000, it might be admitted into the Union as a State. Certain conditions of admission were exacted in accordance with the Ordinance of 1787. The Continental Congress which established the "Northwest Territory" and so wisely provided for its admission into the Union, had its last roll-call 10 Oct. 1788.

The new Congress confirmed the Ordinance relating to this territory. At first the government was administered by means of a governor, secretary, and three judges appointed by Congress, who governed the whole as one district. The governor and judges sitting together had power to make and execute such laws as they

## NORTHWESTERN COLLEGE — NORTON

deemed needful for the district, subject to the approval of Congress, until such time as the territory would have a legislature of its own. Provision was made for a legislature when there were in the territory 5,000 free male inhabitants of full age to be voters. This legislature was to consist of a Legislative Council of five members, chosen by Congress, and a House of Representatives chosen by male inhabitants who were freeholders. The first governor of the Northwest Territory, Arthur St. Clair, was appointed October 1787. He arrived at Marietta, the capital, July 1788. His first official act was the founding of Washington County. He appointed magistrates, established courts, arranged for defense against the Indians, and in every way sought to promote the advancement of the country. The first legislature of the Territory met 24 Sept. 1799. The House of Representatives had 22 members, representatives of the nine counties of the whole Territory. In May 1800, upon petition, Congress divided the Northwest Territory into two territorial governments; the boundary between which was a line extending from the mouth of the Kentucky River north to Canada. The portion east of this line was called "Territory Northwest of the River Ohio," and its capital was Chillicothe. The portion west of this line was called "Indiana Territory" and the capital was Vincennes. William Henry Harrison was first governor of the "Indiana Territory." Virginia completed her articles of cession 1 March 1784. On that same day Jefferson, as chairman of a committee, proposed a plan which was adopted by Congress 23 April 1784. The territory was to be divided into States, each State two degrees wide and the lines to be intersected by two meridians, one passing through the falls of the Ohio and the other through the mouth of Kanawha River. The States were to be named, Chersonesus, Assenisipia, Sylvania, Pelisipia, Illinois, Polypotamis, Washington, Mesopotamia, and Michigan. Slavery or involuntary servitude were to be allowed only as a punishment for crime. The plan never went into effect, and was superseded by the Ordinance of 1787 whereby the Northwest Territory was established as mentioned. In 1785, the year Massachusetts yielded her claims, Congress provided for a survey of the lands in dispute. Ohio, the first State formed out of the Northwest Territory, was admitted in 1803, and was the 17th State of the Union. Michigan Territory was created January 1805, and William Hull was first governor. It was admitted as a State in 1837. Illinois Territory was organized in 1809; Kaskaskia was the capital. It was admitted as a State on 3 Dec. 1818. Indiana was admitted as a State in 1816. A part of Michigan Territory was in 1836 organized as the Territory of Wisconsin. It became a State in 1837. A part of the Territory of Wisconsin is now the eastern part of Minnesota.

**Northwestern College**, a coeducational institution in Naperville, Ill.; founded by the Evangelical Association in 1861. In 1910 there were connected with the school 25 professors and instructors and nearly 500 students. The library contained about 6,000 volumes; the grounds and buildings were valued at \$120,000; the amount of productive funds was \$114,000; the income, about \$20,000; and the benefactions, \$11,500. The number of graduates is about 500.

**Northwestern University**, Ill., chartered under the auspices of the Methodist Episcopal Church, in 1851, and first opened in 1855. The first department organized was the collegiate department; the present organization includes (1) the College of Liberal Arts; (2) the Medical School; (3) the Law School; (4) the School of Pharmacy; (5) the Dental School; and (6) the School of Music; the College and the School of Music are at Evanston, Ill., and the professional schools in the city of Chicago. The university also maintains three secondary schools, namely, the academy at Evanston, Grand Prairie Seminary at Onarga, Ill., and Elgin Academy at Elgin, Ill. The Garrett Biblical Institute, a theological school under separate management, is located on the college campus, and is in close co-operation with the university; the Norwegian-Danish Theological School and the Swedish Theological Seminary are affiliated with the institute. The work of the College of Liberal Arts is mainly elective, the courses being arranged for major work in one department and minor work in another; the degrees of A.B. and B.S. are conferred; the corresponding master's degrees and the degree of doctor of philosophy are conferred for graduate work. The government is by a board of 36 trustees elected by the board, to which are added 8 chosen by Church conferences. Women are admitted, and dormitories on the campus are provided for their use. The campus contains about 75 acres of ground, on the shores of Lake Michigan; the buildings include the old college, the first building erected, University Hall, the Fayerweather Hall of Science, the gymnasium, the observatory, and the library. The professional schools occupy their own buildings in Chicago, the law school, school of pharmacy, and dental school being in Northwestern University Building at the corner of Lake and Dearborn streets, and the medical school having two buildings on Dearborn Street, between 24th and 25th streets. There is a large athletic field, and the athletic affairs of the university are under the management of a committee of 15, 5 from the faculty, 5 from the alumni, and 5 from the students. The Students' Debating Society is affiliated with the Central Debating League, including the students' societies of the universities of Michigan, Chicago, and Minnesota; and with the Northern Oratorical League, including societies from the universities of Michigan, Wisconsin, Iowa, Chicago, Minnesota, and Oberlin College. The college library contains over 50,000 volumes, besides 35,000 pamphlets, and the professional schools have also special libraries. In 1910 the productive funds amounted to \$3,100,000, and the annual income was \$703,000; number of students in attendance, 4,106; number of professors and instructors, 395.

**Norton, nôr'ton, Andrews**, American Unitarian theologian: b. Hingham, Mass., 31 Dec. 1786; d. Newport, R. I., 18 Sept. 1853. He was graduated at Harvard in 1804, and after studying theology was a tutor in Bowdoin College in 1809. He returned to Harvard in 1811 as mathematical tutor there; and became in 1813 librarian of the university and lecturer on Biblical criticism and interpretation. In 1819-30 he was Dexter professor of sacred literature. He

was among the most eminent exponents of Unitarianism, equally strong in his protests against Calvinism and the naturalistic theology represented by Theodore Parker. He published 'Reasons for not Believing the Doctrines of Trinitarians' (1833); 'The Genuineness of the Gospels' (1837-44); 'The Latest Form of Infidelity' (1839).

**Norton, Caroline Elizabeth Sarah Sheridan**, English poet and novelist: b. London 1808; d. there 15 March 1877. A granddaughter of Richard Brinsley Sheridan and a sister of Lady Dufferin, she showed her talent at 13 with 'The Dandies' Rout.' She was married to George Chapple Norton in 1827; procured for him a police magistracy by her influence with the Home Office; broke with her husband in 1836, when he accused Lord Melbourne (q.v.) of criminal intercourse with her; and was vindicated entirely of this charge in a famous suit, the basis of Dickens' *Bardell v. Pickwick*, in the 'Pickwick Papers.' Her differences with her husband were not then ended, for he claimed the custody of her children and the income from her writings. She wrote 'English Laws for Women in the Nineteenth Century,' a pamphlet which contributed to the change of English laws as to the status of women. Two weeks before her death Mrs. Norton married Sir William Stirling Maxwell. Her principal works are: 'The Sorrows of Rosalie' (1829), a Byronic poem; 'The Dream' (1840); 'The Lady of La Garaye' (1862), her best poem, which has much the tone of Campbell; 'A Voice from the Factories' (1836); and 'The Child of the Islands' (1845), both attacking social conditions; and the novels, partly autobiographical, 'Stuart of Dunleath' (1851), 'Lost and Saved' (1863), and 'Old Sir Douglas' (1867).

**Norton, Charles Eliot**, American scholar: b. Cambridge, Mass., 16 Nov. 1827; d. there 21 Oct. 1908. He was a son of Andrews Norton (q.v.) and after he was graduated from Harvard in 1840 was in the employ of a Boston establishment in the India trade. Except a voyage to India in 1849 and various trips to Europe his life was passed in the house where he was born. During the Civil War period he edited the papers of the Loyal Publication Society and with his friend, J. R. Lowell, edited the *North American Review* 1864-8. From 1875 to 1900 he was professor of the history of art at Harvard, becoming professor emeritus in the year last named. As a Harvard professor he exercised a salutary influence over successive generations of collegians before whom he has placed the highest ideas. The young men were helped by him to quicker perception of what culture really is as well as to discriminative discernment between true and false culture—between thoughtful, intelligent citizenship, and the noisy, puppyish assertion that so often passes itself off as patriotism. Few Americans have been sterner critics than he of whatever in American life falls below an ideal standard, and as a consequence few men, not professedly politicians, have been the target for so much adverse comment as was Professor Norton. Stigmatized often as unpatriotic he rose to a much higher level of patriotism than his critics. He enjoyed the friendship of many of the foremost personages of his time and was the

literary executor of such men as Lowell, Carlyle, Emerson, Curtis, and Ruskin. He was the foremost of American Dante scholars and was the founder of the American Dante Society, as well as of the Archæological Institute of America, of which he was the president for many years. His published books include: 'Considerations on Some Recent Social Theories' (1863); 'The New Life of Dante' (1859, a partial translation with essays, followed by a complete translation); 'Notes of Travel and Study in Italy' (1860); 'Historical Study of Church Building in the Middle Ages' (1880); 'The Divine Comedy of Dante' (1891-2), a much prized prose translation. He also edited 'The Early Letters of Thomas Carlyle' (1886); 'Letters of James Russell Lowell' (1894).

**Norton, Charles Led'yard**, American author: b. Farmington, Conn., 11 June 1837. He was graduated at Yale in 1859; served in the Federal army during the Civil War; was editor of the 'Christian Union' 1869-79, and in 1893 became editor of 'Outing.' He has published 'Canoeing in Kanuckia' (1878), with J. Habberton; 'Handbook of Florida' (1890); 'A Medal of Honor Man; or, Cruising among Blockade-Runners' (1896); 'A Soldier of the Legion'; 'The Queen's Rangers'; 'Political Americanisms' (1890); etc.

**Norton, Charles Stewart**, American rear-admiral: b. Albany, N. Y., 10 Aug. 1836. He was graduated at the United States Naval Academy in 1855; became commander in 1870, captain in 1881, commodore in 1894; and was promoted rear-admiral in 1897. During the Civil War he served with honor at Charleston, Hampton Roads, and Port Royal. After the War he served on the board of inspection and survey; commanded the South Atlantic station in 1894-6, and was in charge of the Washington navy yard and station 1896-8. He was retired in the year last named, having reached the age limit.

**Norton, Frank Henry**, American journalist: b. Hingham, Mass., 20 March 1836. He was connected with the Astor Library in New York (1855-65) as assistant librarian and assistant superintendent, and entering journalism in 1872 was editor and owner of the New York 'Era' 1879-81, and from 1883 to 1891 on the staff of the New York *Herald*. Besides such dramatic burlesques, etc., as 'Alhambra,' 'Cupid and Psyche,' he has written 'Life of Alexander H. Stephens' (1883); 'The Malachite Cross' (1894); etc.

**Norton, John**, American colonial clergyman: b. Shortford, Hertfordshire, England, 6 May 1606; d. Boston, Mass., 5 April 1663. He was educated at Cambridge University, entered the ministry and in 1635 left England and came to Boston. He was pastor at Ipswich in 1636-52; then he succeeded John Cotton as colleague of John Wilson in the pastorate of the First Church of Boston. In this charge his influence steadily increased and his opinions came to be sought by officials of both church and state. He was still in this position when the colonies decided to send their petition to George II. in 1662, and was selected to accompany General Bradstreet; though the petition was nominally granted and Norton had without doubt performed his delicate task with fidelity, the colonies were dissatisfied with the results and hencefor-

ward his popularity waned. This change in public feeling was without doubt the cause of his death in the following year. He wrote: 'Responsio ad Totam Questionum Syllogem'; 'The Orthodox Evangelist' (1654); 'The Heart of New England Rent by the Blasphemies of the Present Generation' (1660); etc.

**Norton, Lillian.** See **NORDICA, LILLIAN.**

**Norton, Sidney Augustus,** American chemist: b. Bloomfield, Trumbull County, Ohio, 11 Jan. 1835. He was graduated from Union College, Schenectady, N. Y., in 1856 and from Miami Medical College in Cincinnati 1867, in which latter institution he was professor of chemistry 1867-72. In 1873 he became professor of chemistry in Ohio State University. He has published: 'Elements of Natural Philosophy' (1870); 'Essays and Notes' (1874); 'Elements of Physics' (1875); 'Elements of Inorganic Chemistry' (1878); 'Organic Chemistry' (1884); etc.

**Norton, Thomas,** English dramatist: b. Bedfordshire, England, 1532; d. England 1584. He collaborated with Sackville in writing 'The Tragedie of Gorboduc' (1560-1) which was the first English blank-verse tragedy.

**Norton, Thomas Herbert,** American chemist: b. Rushford, N. Y., 30 June 1851. He was graduated from Hamilton College, Clinton, N. Y., in 1873 and afterward studied at Heidelberg. From 1878 to 1883 he was manager of important chemical works in Paris, France, and was professor of chemistry in the University of Cincinnati 1883-1900. In May 1900 he was appointed to establish the United States consulate at Harput, Turkey.

**Norton Sound,** an arm of Bering Sea indenting the west shore of Alaska. It is about 220 miles long and 200 miles wide from Cape Nome to Cape Dyer. The Yukon is the largest river flowing into the Sound, a number of short streams enter from the north. The coast is irregular, the largest indentations are Golofnin and Norton bays and Golofnin Sound. A number of islands are along the coast, the largest are in the eastern part of the Sound. Nome (q.v.) is the most important city on the coast. Captain Cook discovered Norton Sound in 1778.

**Norumbega, nō-rūm-bē'gā,** a name given by the early explorers to various parts of the eastern coast of North America, also to a river, and to an Indian city. In 1539 the name was applied to the whole coast from Cape Breton to Florida, but this seems to have been on the authority of an anonymous narrative called 'Dieppe Captain.' The map of Verrazano's voyage, published in 1529, locates Aranbega on the coast of New England; Mercator's map, published in 1541, locates Anorumbega near the Hudson River; Gastaldi's map, 1556, locates Norumbega near Cape Breton. Other accounts mention Norumbega as a large river, brackish near the mouth; and still others picture it as a city with high towers and substantial houses. The rivers mentioned are supposed to have been Penobscot, Connecticut, or Hudson. Champlain, in 1605, applied the name to Maine and also to the Penobscot River. Humphrey Gilbert (q.v.) in 1583, began an exploration of the beautiful country of Norumbega, and so convinced was he of its existence, that he took with him a poet to

sing its praises. A map of 1582 makes Penobscot River a strait connecting the Saint Lawrence with the ocean at the mouth of the Penobscot. The country between was called Norumbega. The origin of the word has been attributed to many languages; as an Indian word meaning "still water"; a Spanish word meaning "fields"; a Norse word, *Norvegr*, meaning Norway; etc. In 1889 Prof. Horsford caused the erection of a memorial tower at the confluence of the Charles River and Stony Brook, near Watertown, Mass., in memory of Norumbega, a Norse city which once existed here. Considerable research has been given to the matter, and some historians claim to have reasonable proof of the origin and location of what by many is considered a mythical city or a name applied by different explorers to different rivers and locations on the coast between Cape Breton and Florida. Consult: Fiske, 'Dutch and Quaker Colonies in America'; Horsford, 'Defenses of Norumbega'; and 'Discovery of Ancient City of Norumbega'; Beauvois, 'La Norumbègue.'

**Norval, nōr'vāl, Young,** son of Lady Randolph and her first husband, Sir Malcolm Douglas, in Homes' tragedy, 'Douglas' (1757). He is reared in obscurity and his identity is revealed to Lady Randolph only after he has saved the life of his stepfather. Glenalvon, the latter's heir, jealous of Norval, incites Lord Randolph's jealousy against him and a duel ensues in which Glenalvon is killed and Norval dies immediately after, whereupon Lady Randolph flings herself from a precipice. The part was much favored by both Kemble and Macready.

**Norwalk, nōr'wāk,** Conn., city in Fairfield County; on the Norwalk River, near Long Island Sound, and on the New York, N. H. & H. R.R.; about 30 miles east by north of New York city and 12 miles west by south of Bridgeport. Steamers ply regularly between Norwalk and New York. It was settled in 1649, and in 1651 was incorporated as a town, which included what is now South Norwalk (q.v.). Norwalk was incorporated as a borough in 1836 and in 1893 was chartered as a city. In 1779 it was plundered and burned by a British force under Generals Garth and Tryon. The chief manufactures are silks, felt goods, air compressors, locks, hats, shirts, corsets, shoes, worsted goods, and machinery. The coastwise trade, the oyster interests, and the shipping of farm products engage the attention of a number. Norwalk has a State Armory, the Fairfield County Children's Home, and the Norwalk Hospital. The Carnegie Library and the public and parish schools are the principal educational institutions. The city owns and operates the waterworks. Pop. (1910) 6,954. Consult: Byington, 'Ancient and Modern Norwalk' in the 'Connecticut Quarterly,' Vol. I.; Selleck, 'Norwalk.'

**Norwalk, Ohio,** city, county-seat of Huron County; on the Wheeling & L. E. (main line, and also Huron branch), Lake Shore & M. S., and Cleveland & S. W. R.R.'s; about 56 miles west by south of Cleveland and 10 miles south of Lake Erie. Huron County is one of the 10 counties which composed the "Western Reserve" or the "Connecticut Reserve." (See **WESTERN RESERVE**.) The city is connected with a number of villages, and cities by electric railroad. It was







# NORWAY AND SWEDEN

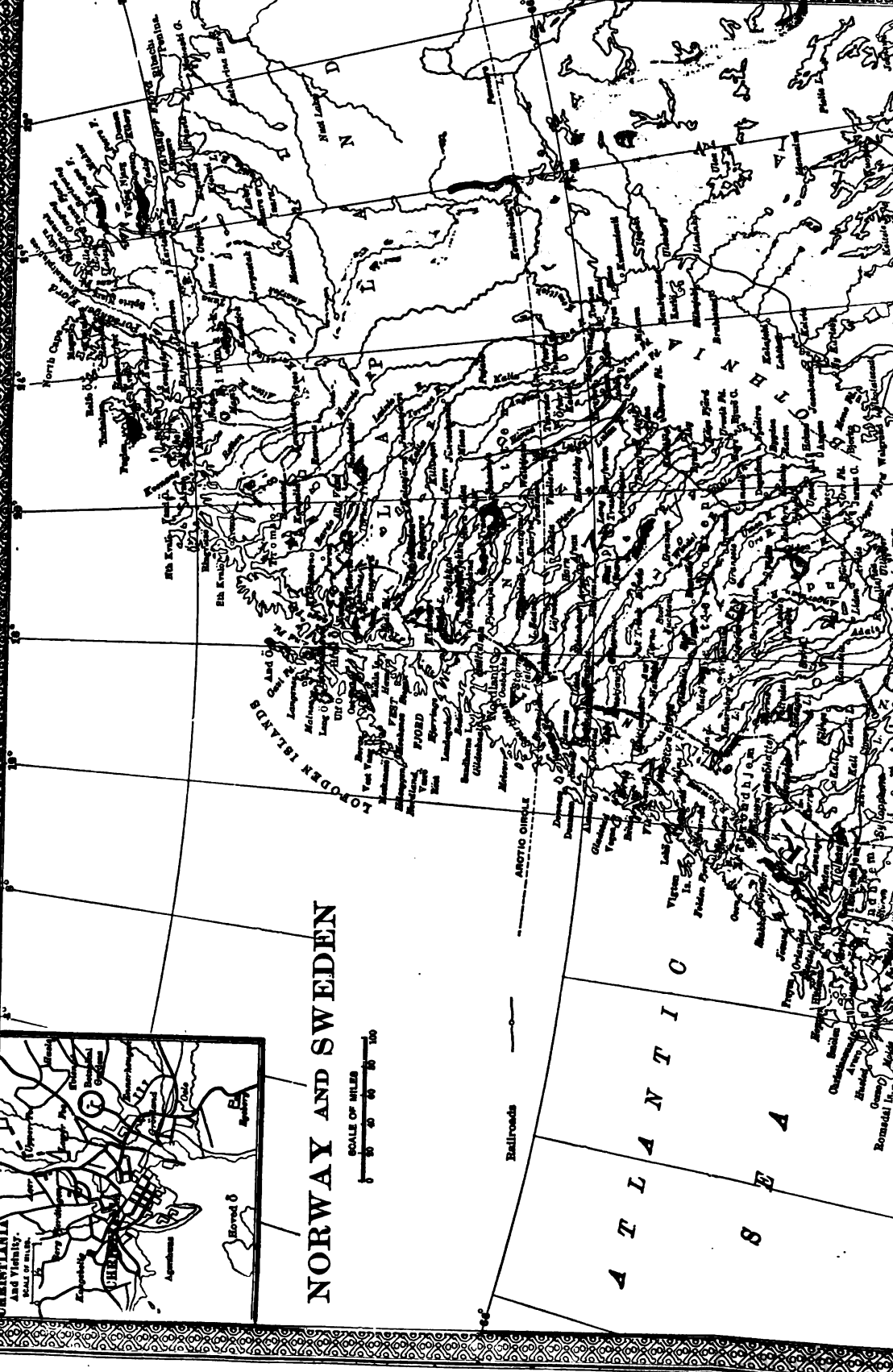
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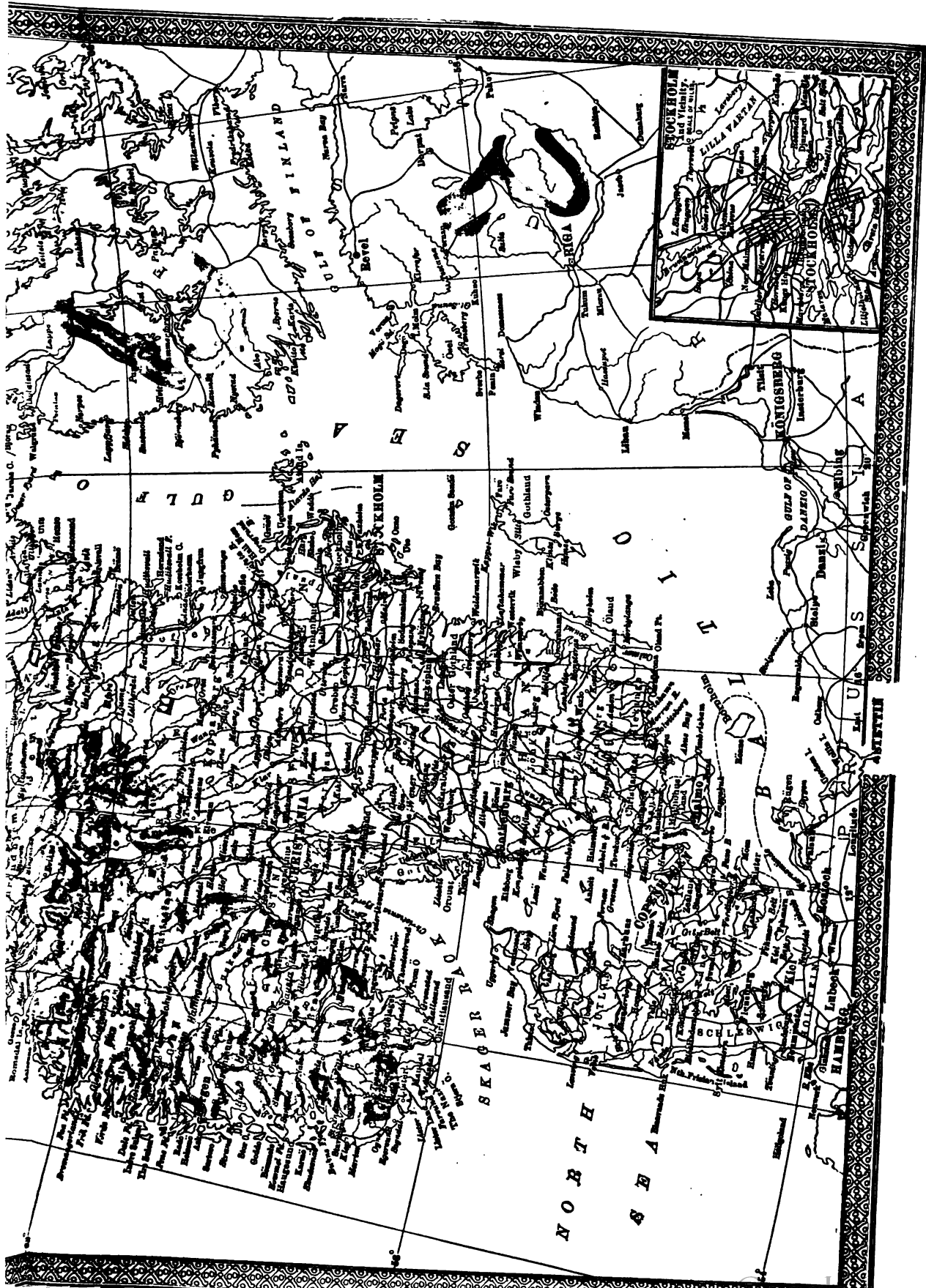
Railroads

ARCTIC CIRCLE

ATLANTIC OCEAN

LAPLAND ISLANDS







## NORWAY

settled in 1816 by Platt Benedict, Elisha Whitteley, and others; incorporated in 1828 and chartered in 1840. It is in a productive agricultural region, and has extensive manufacturing interests. The steel and iron works have 500 employees; piano factory, 400 employees; railroad shops, 400; printing works, 250; pyrography works, 150; canneries, 50; machine-shops, 100. There are a number of smaller industrial establishments each having from 5 to 20 employees. Norwalk has a large trade in its own manufactures and in farm and dairy products, fruit, and live-stock. It has a fine court-house, several well-built business blocks, and a number of handsome residences. The educational institutions are one central and four ward public schools, two parish schools (R.C.), and a Carnegie Library. There are 10 churches. The four banks have a combined capital of \$250,000; the amount of the annual business is \$1,350,000. The government is vested in a mayor, who holds office two years, and a council of six members chosen by popular vote. About three-fourths of the population are native born, and the others are Germans and Irish. Pop. (1890) 7,195; (1900) 7,074; (1910) 7,858.

J. H. WILLIAMS,  
Editor 'Norwalk Chronicle.'

**Norway** (Norwegian *NORGE*; Swedish *NORRIGE* or *NORRIKE*, signifying North Kingdom), the western kingdom of the Scandinavian peninsula in the north of Europe, united 1814-1905 with Sweden (q.v.) so as to form the single monarchy of *Sverige och Norge*—Sweden and Norway,—and ruled 1872-1905 by Oscar II. Norway is bounded on the northeast by Russian Lapland, east by Sweden, and on all other sides by the sea, the Arctic Ocean being on the north, the Atlantic and the North Sea on the northwest and west, and the Skager-Rack on the south. From the Naze on the south, to a point adjoining the North Cape, the length southwest to northeast is about 1,080 miles; greatest breadth, measured nearly in the parallel of 60°, about 275 miles; area, 124,130 square miles. For administrative purposes Norway is divided into six provinces corresponding with the stifts, or dioceses, and subdivided into twenty bailiwicks (*amter*). The stifts are Christiania, Hamar, Christiansand, Bergen, Trondhjem, and Tromsø. Christiania is the capital.

**Topography.**—The coast consists for the most part of bold precipitous cliffs, and is remarkable for the vast number of islands by which it is lined, and the bays or fjords which narrow, deep, and winding, cut into it in all directions, providing an almost uninterrupted series of excellent natural harbors of refuge. Many of these fjords are deeper than the sea outside which averages 200 fathoms; Sogne Fjord, for instance is 2,820 feet deeper; Hardanger Fjord 930 feet; and Vest and Nord Fjords 840 feet. Some of these fjords penetrate great distances inland and send off numerous branching arms. The Sogne Fjord cuts its way to the foot of the Jotun Fjeld, 106 miles from the ocean, and Hardanger Fjord (q.v.) encircling the Folgefond is 68 miles long; the Jostedal lies between the Nord and Sogne Fjords. These three are the most characteristic of the fjords and offer some of the most sublime and accessible scenery in Norway. The surface generally is mountainous, particularly in the west and

north, the mountain masses, however, assuming the form of great plateaus or tablelands called fjelds, fields or fells, as the Hardanger Fjeld, Dovre Fjeld, etc. The main range, the Kjölen or Kell Mountains from 3,000 to 6,000 feet high, runs parallel to the coast from the plateau of Finmark in the north to 63° in the south and then divides, as the backbone of the peninsula forming the boundary with Sweden. The highest summits belong to the Sogne Fjeld, a congeries of elevated masses, glaciers, and snow fields in the centre of the south division of the kingdom, where rise Galdhøppingen 8,400 feet, the Glitretind 8,384 feet and Skagastölstind 7,879 feet. The line of perpetual snow ranges from 5,000 feet in the south to 3,000 feet in the north. In general the valleys are short and abrupt; and the streams, dashing down impetuously through rocky gorges, form numerous cascades. The leveler portions of plateau regions consist of dreary moors, covered in winter with snow and in summer with coarse grass and heather, studded with numerous tarns and forest belts of conifers, birches, willows, etc. The grass affords pasturage to the sheep and cattle of the dalesmen. The *sætre* or huts of the herd-girls and the wood-cutters are the only habitations in the mountain solitudes.

**Hydrography.**—The short distance from the western slope to the western coast gives rise to a great number of minor streams, which proceed directly to the shore or the fjords. On the eastern slope the streams do not properly assume the character of rivers till they have run a considerable part of their course in Sweden. The few important rivers of Norway have a southerly direction in accordance with the general slope already referred to, and discharge themselves into the Skager-Rack; of these the longest are the Glommen 350 miles, Drammen 163 miles, with its tributary the Hallingdal 113 miles, Numedal Laagen 143 miles, and Otteren 140 miles. Some of these streams in their lower courses expand into long narrow lakes of considerable size: Lake Mjösen is 60 miles long, and its bottom is 1,080 feet below the level of the sea; others are Randsfjord (43 miles long), Tyrifjord (19 miles), and Fæmund (35 miles long and 2,300 feet above sea-level). The most important rivers in the north are the Tana, which forms part of the boundary between Russia and Norway, and falls into the Arctic Ocean; and the Namsen, which falls into the Atlantic.

**Geology and Mineral Resources.**—The prevailing rocks of Norway are gneiss and mica-slate, of which all the loftier mountains are composed. Granite is of comparatively rare occurrence. On some of the plateau blocks of conglomerate occupy a large part of the surface. Porphyry, argillaceous schist, and limestone occur, but in very limited quantities, and rocks of volcanic formation are rare. Almost all parts of the country bear traces of the grinding action to which the structural rocks were subjected during the Glacial period. The minerals are numerous and abundant; the most important are iron, copper, silver, and cobalt, others are nickel, feldspar, and marble. For a century down to about 1870 the copper and iron mines of Røros and the silver mines of Kongsberg yielded considerable outputs; but have since declined. The principal mine is at Vigsnes on Karmö, at the entrance to Bukken Fjord, which yields \$300,000 worth of pyrites in the year. The total mineral

## NORWAY

output of Norway, iron pyrites, silver, copper, apatite, nickel, was valued at \$1,567,575 in 1900, showing an increase over preceding years. The silver mined was valued at \$94,500. Barely 2,000 men are employed in this occupation.

*Climate.*—Known as "The Land of the Midnight Sun," one third of Norway lies within the frozen zone and the greater part between the same degrees of latitude as Greenland. It would in all probability be still covered with a similar ice-cap to Greenland, as it was in the end of the Tertiary period, were its shores, west and north, not washed by the Gulf Stream. It is mainly owing to this warm oceanic artery that Norway is habitable; its influence, together with the direction of the parallel mountain rampart, the distribution of the atmospheric pressure, and the presence of deep-sea banks off the coast, determines the predominant climatological features of the country. The isotherms do not run from west to east, but parallel to the coast. The harbors on the west are never blocked with ice; while in places more inland, though much farther south, as at Christiania, this regularly happens. Hammerfest, for instance, on the north coast, in lat. 70° 40' N., has a winter mean of 22-6° F., 3° higher than Christiania, which has virtually an inland site, in lat. 59° 55' N. In winter the west coast districts are the warmest, and the cold increases in intensity according to the distance inland; whereas in summer the reverse is the case, though altitude is then a more potent influencing factor than in winter. The places that have the lowest winter mean (11.8°) are all inland, as Elverum and Røros (Røraas), near the Swedish frontier, Kautokeino (in southern Finmark), and Nyborg (at the head of Varanger Fjord); at all these places the mercury has been known to freeze (—40° F.). The places which have the highest summer temperature are Christiania, the southwest extremity of the country, the heads of the western fjords, and the interior of Finmark. The prevalent southwest winds bring considerable rainfall, 40 to 70 inches in the year, to the west coast of southern Norway. In the interior only 12 to 16 inches fall during the year.

*Flora and Fauna.*—In general the mountain slopes up to a certain height are clothed with magnificent pine forests, and at lower elevations the oak and the beech are by no means uncommon. In the loftier altitudes, below the snow line, willows, lichens, and numerous wild berries—cranberries, raspberries, bilberries, and cloudberries—are found in summer. Among wild animals are the bear, wolf, lynx, fox, wild reindeer, and lemming; buzzards, kestrels, and owls prey on the smaller animals and birds; snipe, loom and teal abound in the lakes; lapwings and plovers breed in the tarns; in winter the ptarmigan is plentiful, and the eagle, sparrowhawk, woodcock, raven, and crow are common throughout the kingdom.

*Forestry.*—The forests cover about 26,300 square miles, of which 73 per cent are pine trees; 4,000 square miles are under state control. The area of late years has greatly diminished, but trees are being systematically planted in several parts, especially in the southern and eastern parts of the country. The trees are cut down principally in winter and floated down the streams in early spring to the sawmills at their mouths. The saw mills, wood pulp, and cellulose

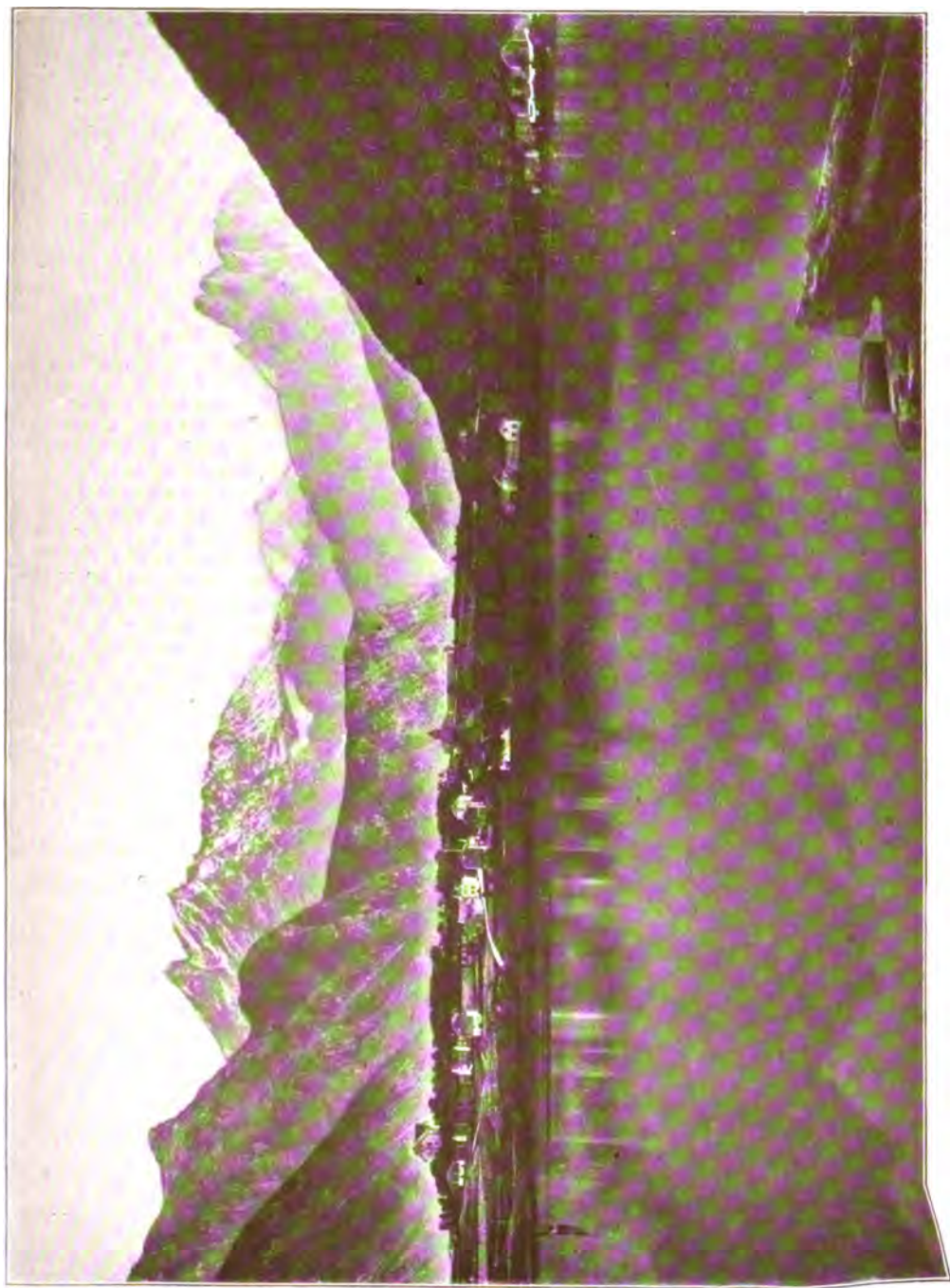
factories, give employment to about 12,000 people. The export of manufactured lumber in 1901 amounted to over \$9,530,000, and of wood pulp over \$6,400,000.

*Fisheries.*—The fisheries are of great value, and contribute mainly to the support of the inhabitants along the seaboard, from the Naze to the entrance of the White Sea. The fisheries are divided into three chief divisions—Lofoden, Romsdal, and Finmark. They include cod, herring, mackerel, salmon, shark, walrus, seal, and lobster fisheries, the cod and herring fisheries being by far the most important. Over 100,000 persons are employed in the fisheries, and the annual total value of the products of the fisheries considerably exceeds \$5,000,000, more than two thirds of which is for cod. The rivers and lakes abound with salmon and salmon-trout, and make Norway one of the best angling countries in the world.

*Land Tenure, Agriculture, etc.*—The farms are generally the property of those who cultivate them, small proprietors being common in Norway. They often include a large stretch of mountain-pasture, perhaps 40 or 50 miles from the homestead, to which the cattle are sent for several months in summer. Among the crops cultivated for food the principal is barley, which ripens at 70° of latitude; rye is successfully cultivated up to 69°; oats to 68°; but wheat not beyond 64°, and that only in the most favorable seasons. Another most valuable crop is potatoes, grown with success even in Finmark. Some hemp and flax are also produced, and in the southern part of the country some tobacco is grown. Fruit, too, particularly the apple, pear, and cherry, is raised generally in all the lower localities of the south and the centre. The grain raised falls far short of the consumption. One of the most extensive and profitable branches of rural economy is the rearing of cattle, for which many parts of the country are well adapted. The breeds, however, are inferior. The milk of the cows, however, is good, and enters largely into the food of the inhabitants; and butter is produced in such quantities that there is a considerable export trade of that commodity. Sheep are less numerous than goats, and yield a coarse though abundant and warm wool; swine are not viewed with much favor. The horses are vigorous and sure-footed, but of diminutive size; the ponies are among the best of their kind, and are often exported. Another domestic animal of great value is the reindeer, which forms the principal stock of the northern provinces.

*Commerce.*—The export trade is chiefly confined to raw produce. The principal items are timber, with wood-pulp and cellulose; fish, smoked and dry, with ice, fish-oil, etc.; also copper ore, iron pyrites, lucifer matches, paper, etc. The chief imports are grain, bacon, and other provisions, coals, textiles, wool, cotton, hemp, salt, sugar, coffee, tobacco, wine, brandy, etc. This trade is chiefly concentrated in the towns of Bergen, Christiania, and Trondhjem, though Drammen, Stavanger, Christiansand, and Arendal likewise have a considerable share in the commerce of the country. During the latter half of the 19th century the foreign commerce of Norway more than quadrupled; in 1901 the exports amounted to over \$41,400,000 and the imports to over \$76,900,000.

NORWAY.



VEBLUNGSNÆS AND ROMSDALS HORN.





## NORWAY

**Manufactures.**—These have made comparatively little progress, but are increasing since the protective system adopted by the non-renewal of the customs treaty with Sweden in 1897. The purely industrial establishments are grouped mainly around Christiania, and do not employ more than 45,000 persons. Besides those already mentioned, the more important are textile manufactures, machine-shops, chemical factories, iron and metal works, brick-works, flour-mills, tobacco-factories, breweries, and in a minor degree tanneries, distilleries, and factories for matches, glass, oil (fish and vegetable), and paper.

**Shipping and Navigation.**—For its population, Norway had a large mercantile navy, amounting in 1909 to 8,550 vessels (of which 1,645 were steamships), with an aggregate tonnage of 1,577,659. The Norwegians are among the busiest sea-carriers of the world. Ship-building and supplemental industries are carried on chiefly at Christiania in about 150 establishments employing over 3,000 men. The Norwegian ports were entered in 1909 by 12,924 vessels of 4,402,461 tons and cleared by 12,945 vessels of 4,422,323 tons.

**Railways, Communications, etc.**—In 1908 there were 1,605 miles of railroad, of which 1,354 miles were controlled by the state, and the rest operated by private companies; there were also 12,120 miles of telegraph and telephone lines, most of which also belong to the state with 77,049 miles of wire. The national and communal roads had an aggregate length of over 15,000 miles; the principal means of communication, however, are steamboats.

**Weights, Measures, and Money.**—The metric system (q.v.) of weights and measures was introduced in 1879 and became obligatory 1 July 1882. The unit of value is the Krone, equal to 100 öre, comparative value 27 cents; the 20 Krone gold piece weighing 8.96 grams contains 8.0645 grams of fine gold, and the silver Krone weighing 7.5 grams contains 6 grams of fine silver.

**Banking.**—There are two state banks, the Bank of Norway—'Norges Bank' and the 'Kongeriget Norges Hypothekbank' or Mortgage Bank of the Kingdom of Norway. The Bank of Norway, although a joint-stock bank, is largely owned by the state, is governed by state laws, and administered by directors elected by the parliament, excepting the president, who is appointed by the king. It is the only bank authorized to issue bank notes, and besides state business, is a general deposit, discount, circulation, and loan institution. Its assets in 1908 amounted to nearly \$30,000,000; its balance to about \$8,000,000. The 'Kongeriget Norges Hypothekbank' established by the state in 1852 to issue loans on mortgage, had in 1908 capital of over \$5,000,000, and a reserve fund of about \$250,000. The loans on mortgage amounted to more than \$43,000,000, and the bonds issued aggregated as much again. Private banking was represented by 93 joint-stock banks with a paid up capital of \$11,000,000, and there were 469 chartered savings banks, controlled by the minister of finance with over \$108,000,000 on deposit and 868,614 depositors.

**Government, etc.**—Norway is a constitutional and hereditary monarchy, the royal succession being in the direct male line in the order of premogeniture. If there is no male heir to the throne, the King may propose a suc-

cessor to the Storting (or legislative assembly), the assembly reserving the right to nominate another if it does not approve the King's choice. On June 7, 1905, Norway declared its union with Sweden dissolved, and an agreement to this effect was signed 26 October 1905. Prince Carl of Denmark was elected King 18 November, and accepted the crown as King Haakon VII November 20, 1905. His wife, whom he married 22 July 1896, was Princess Maud, the third daughter of the late Edward VII, of England. Their son, Prince Olav, Crown Prince, was born 2 July 1903.

The constitution, or Grundlov, bearing originally date of 17 May 1814, and many times amended, vests the legislative power in the Storting, which represented the sovereign power of the people. The King has the veto power, which may be twice exercised on a measure; but if the same bill passes three Storting which have been assembled by separate and subsequent elections, it becomes law without the royal approval. The King commands the army and navy, and makes all appointments, but, except in a few cases, is not allowed to nominate any but Norwegians to public offices under the crown. He exercises his authority through a Council of State, composed of one Minister of State and at least seven Councillors, who may be present in the Storting and take part in public discussions without voting. Local government is exercised by a chief executive functionary called the Amtmaend in each of the 20 districts into which the country is divided.

The ordinary revenues of the crown as shown by the budget for the year ending 30 June 1910, were 107,080,000 Kroner (the value of a Kroner being about 27 cents); extraordinary revenues, 7,273,200 Kroner; total revenue, 114,353,200 Kroner. The prospective expenditure, as listed in the budget of that time included State railways, 17,290,600 Kroner; army, 13,493,800 Kroner; post, telegraph, etc., 13,988,800 Kroner; Church, arts and education, 13,176,600 Kroner; interest on public debt, 11,105,700 Kroner, etc.

The most important fortresses of Norway are Oscarsborg and the new fortresses by Agdenes, Bergen, Tönsberg, and Kristiansand. The army of Norway is a national militia, somewhat resembling that of Switzerland. The navy consists of 4 war ships, 2 old coast service monitors, 3 gunboats, 3 destroyers, 29 torpedo boats, and one submarine.

**Ethnology.**—The Norwegians are almost entirely of Scandinavian origin. They are about the middle height, light-haired, and blue-eyed, sober and thrifty, honest and industrious, and where not devoted to a rural life have a strong passion for the sea, and make excellent sailors. The Finns or Lapons dwelling in Nordland, and more especially in Finnmark, bear little resemblance to the Norwegians proper. The Qvaens, though dwelling in the same localities with the Finns, are very easily distinguished from them both by physical features and habits.

**Population.**—In 1908 the population was estimated at 2,352,786. Illegitimacy is somewhat high, averaging 8.5 per cent of the births. The Laps numbered 19,545, and Finns 7,767. The population is more rural than urban, only about one sixth living in the towns. There is comparatively considerable emigration, the number in 1907 being 22,135, of whom 20,615 came to

## NORWEGIAN LUTHERAN COLLEGE — NORWICH

the United States. From 1900 to 1908 the total increase in the population of Norway was 112,906.

**Education.**—Primary education is compulsory, and is conducted on a national system, according to which gratuitous elementary instruction is placed within the reach of all. The schools, designated by the name of *almue skoler*, or people's schools, are stationed in all towns and parishes. In the country the instruction is only elementary; in the schools themselves an important distinction is made, some being what is called *fast skoler*, or stationary schools, and others *omgangs skoler*, or ambulatory schools. The latter, as their name implies, shift about at certain periods of the year, from place to place in the more thinly-peopled districts; and thus have the effect of bringing education to those who, but for this arrangement, would be doomed to live without it. Towns possess, in addition to these people's schools, what are called middle schools, middle and royal schools, burgher schools, Latin or learned schools, in all of which superior instruction is given; there are also four cathedral schools, one each in the towns of Christiania, Bergen, Trondhjem, and Christiansand. At the head of all the educational establishments is the Royal Frederick University of Christiania, with five faculties, 63 professors, which, in 1907, had 1,557 students. For *Language and Literature* see SCANDINAVIAN LANGUAGES AND LITERATURE.

**Religion.**—The great body of the people are Protestants of the Lutheran confession. Though no express law prohibited other religious bodies from meeting for public worship, the popular feeling was for long so decidedly opposed to it that a law, permitting them so to meet, and form regular congregations under their own pastors, was passed for the first time in 1845. Recently there were 52,680 dissenters, including 1,969 Roman Catholics. The country is divided into six bishoprics (stifts), corresponding in name and extent with the administrative provinces; and into 902 parishes. With exception of the cathedral of Trondhjem, founded 1180 or 1183 A.D., and a few other churches which are stone edifices, the churches in Norway are generally built of wood. Many of them are very ancient structures, dating as far back as the 11th and 12th centuries.

**Judiciary.**—Norway is divided into 108 districts for the administration of civil justice. Of these districts each with an inferior court, 26 are urban, and the rest rural courts, each with one chief, and two other judges, and a *Höiesteret*, or supreme court, for the whole kingdom, consisting of a president and a minimum of six other judges. In each town and district there is a *Forligelseskommission*, or court of mediation, consisting of two men chosen by the electors, before which civil cases are generally first brought.

**History.**—In the earliest times Norway was divided among petty kings or chiefs (jarls), and its people were notorious for their piratical habits (see NORTHMEN). Harold Fair Hair, who ruled from 863 to 933, succeeded in bringing the whole country under his sway, and was succeeded by his son Erick. He was ultimately driven from the throne, which was seized in 938 by his brother, Hako I., who had embraced Christianity in England. Magnus the Good, the son of Saint Olaf and Alfhild, an English lady

of noble birth, was called to the throne in 1036; and having in 1042 succeeded also to the throne of Denmark, united both under one monarchy (see DENMARK). After his death the crowns of Norway and Denmark again passed to different individuals. In 1319 the crown of Norway and Sweden became for a short time united in the person of Magnus V. Erick of Pomerania succeeded, by separate titles, to Norway, Sweden, and Denmark; and in 1397 was crowned king of the three kingdoms. Sweden then for a time became a separate kingdom; but the union between Denmark and Norway was drawn closer and closer, and very much to the disadvantage of the latter. The subsequent history of Norway becomes for a long period a part of that of Denmark. After the defeat of Napoleon by the allies in 1813 it was arranged by the treaty of Vienna in 1814 that Denmark must cede Norway to Sweden, and the result was the union of the two countries under the Swedish crown. The union has been accompanied with a certain amount of friction, partly owing to the entirely democratic character of the constitution of Norway, in which country titles of nobility were abolished early in the 19th century. The right claimed by the king to veto absolutely bills passed by elected representatives met with an overwhelming protest by the people, the struggle lasting till 1884. In 1905 a grave constitutional struggle arose between the two countries, from the demand for greater independence for Norway in her foreign policy. The situation developed an acute crisis over the refusal of King Oscar to grant separate consular service to Norway. On 7 June the Storting passed a resolution for dissolving the union of the two countries, and after a period of strained relations and warlike preparations a treaty was drawn up at Karlstad, the Swedish Riksdag officially adopting it on 16 October, thus recognizing Norway's independence. On 20 Nov. 1905 Prince Charles of Denmark accepted the throne, taking the title of Haakon VII. In 1907 a treaty guaranteeing the integrity of Norwegian territory was signed by Great Britain, France, Russia, and Germany, which was approved by Norway in 1908. In 1907, woman suffrage was adopted.

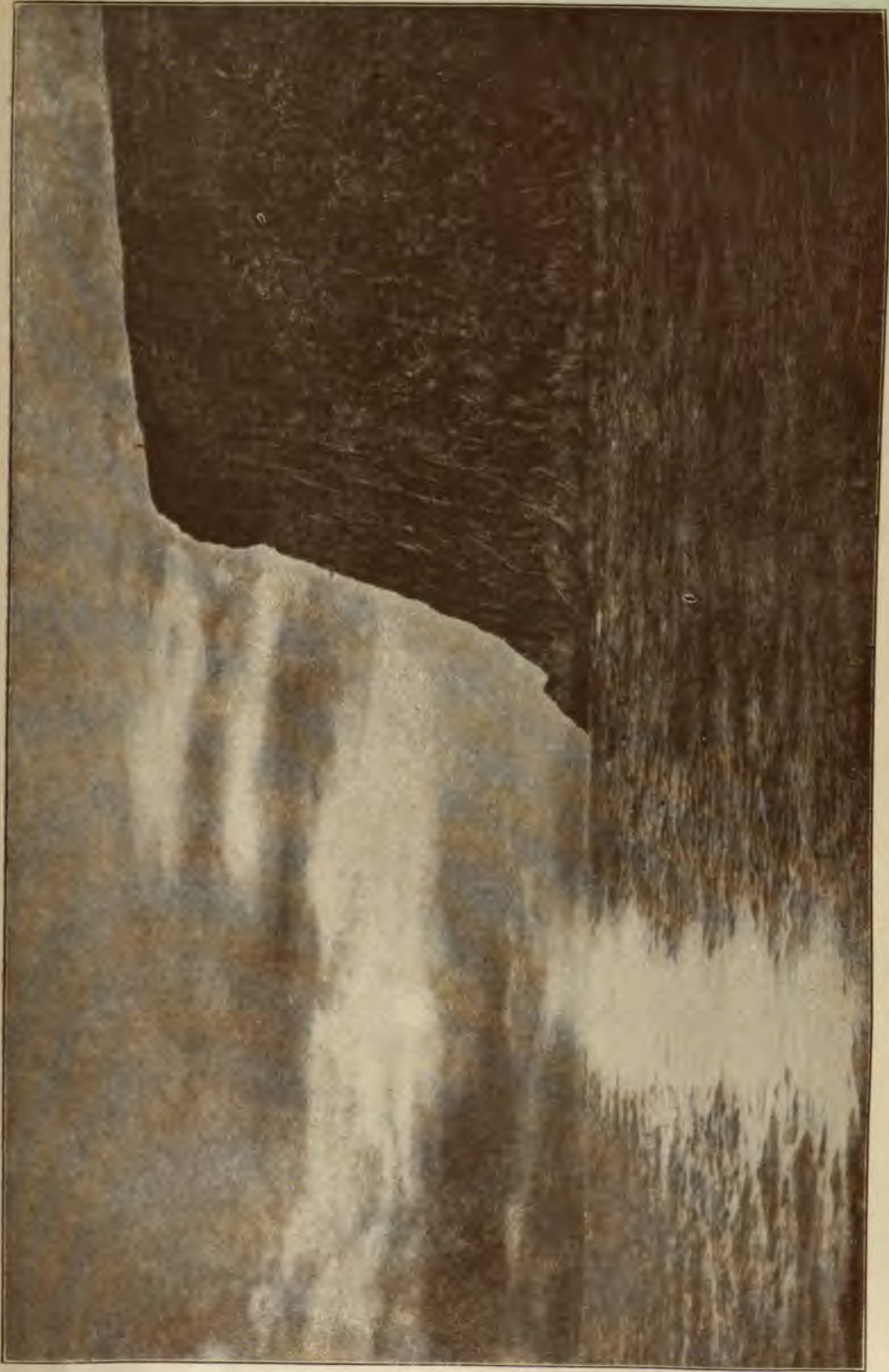
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**Norwegian Lutheran College**, situated at Decorah, Iowa. It was founded in 1861 under the auspices of the Lutheran Church. There is a preparatory department, besides the regular collegiate department. The degree of A. B. is conferred. In 1905 the value of the productive funds was \$11,000; the annual income amounted to \$6,800; the library contained 13,438 volumes. The students numbered 195, and the faculty 13.

**Norwich**, nôr'wîch, Conn., city, county-seat of New London County; at the junction of the

NORWAY.



NORTH CAPE.



## NORWICH

Shetucket and Yantic rivers where they form the Thames, at the head of navigation on the Thames, and on the New York, N. H. & H. and the Vermont C. R.R.'s; about 14 miles from Long Island Sound, and 40 miles southeast of Hartford. It was settled in 1659 by a company of English from Saybrook, and the place was named after Norwich, England. It was incorporated as a township in 1685 and chartered as city in 1784. Its surface is irregular and it is surrounded by picturesque valleys and hills. The land around is productive but its exceptional water-power advantages have contributed to the extensive development of manufacturing industries. The chief manufactures are firearms, leather, silk fabrics, cotton and woolen goods, machinery, stoves, iron and iron products, and furniture. There are about 50 manufacturing establishments which have a total of 5,000 employees. It has a large trade in its own manufactures, lumber, farm products, coal, and clothing and food supplies for the interior of western Connecticut. It is the industrial and commercial centre of a large portion of New London and Windham counties. The educational institutions are public and parish schools, the Free Academy, built and endowed by public-spirited citizens, the Art Museum connected with the Academy, and the Otis Free Library, which has about 30,000 volumes. The prominent buildings are the Slater Memorial Hall, the State Armory, State Insane Hospital, the William Backus Hospital, the Y. M. C. A. building, the court-house, and Saint Patrick's Roman Catholic Church. There are several good church buildings and a large number of handsome residences. The Indian burying ground which contains the grave of Uncas, the place where Miantonomoh fell, the ruins of colonial homes, the places where once lived the Huntingtons, and others prominent in Revolutionary times, are all of historic interest.

The five national and three savings banks have a combined capital of \$1,600,000; the deposits are over \$24,000,000. The revised charter of 1877 provides for a mayor, who holds office two years, and a council of 12 members, six of whom are elected each year. The city owns and operates the waterworks. Pop. (1900) 17,251; (1910) 20,367. Consult Caulkins, 'History of Norwich.'

**Norwich**, nor'ij, England, capital of Norfolk, see of an extensive bishopric, the largest city on the eastern side of England; forms with its precincts a county of itself. It is on the river Wensum; 108 miles N.E. by N. of London (114 by rail); 19 miles W. of Yarmouth—the celebrated fishing port; 99 miles E.S.E. of the city of Lincoln. Norwich city proper extends more than a mile and a half in length from north to south on both sides of the Wensum, and a mile and a quarter in its greatest breadth. The geological formation consists of chalk, upper drift and crag; beds of sand and gravel.

**Railways.**—The first railway in Norfolk was from Norwich to Yarmouth 1 May 1844; that from Norwich to London July 1845. There are now three railway stations at Norwich. The Norwich electric tramway system, connecting all parts of the city, opened 30 July 1900, is in the hands of a private company.

**Industries.**—The great Colman factory—mustard, flour, and starch—represents the most important industry in Norwich, the premises on the river front extending three-quarters

of a mile. Boot and shoemaking and brewing are prominent manufactures, and Norwich has one of the largest organ manufactories in Great Britain, that of Messrs. Norman and Beard, Limited. Norwich market place is a very fine one, and the cattle market is one of the most commodious in England.

**Public Buildings, etc.**—The great Norman Castle was probably built by William Fitz Osbern, one of the Conqueror's captains, as a place of arms, and to overawe the subject Saxons. The keep, which remains, is nearly square, 92 by 96 feet, and 76 feet high; it is only exceeded in England by the Norman keep at Colchester, Essex. By public subscriptions the Castle, long used as a prison, was converted into a splendid Museum and Art Gallery, opened 23 Oct. 1894. The ornithological specimens in this Museum are of exceptional value.

The Cathedral is a grand Anglo-Norman pile, 407 feet long, and 72 feet broad, the spire reaching 315 feet from the ground. It contains several ancient chapels, a beautiful choir, and the cloisters are the most spacious in England except Gloucester. The Erpingham Gate and St. Ethelbert's Gate, which give entrance to the Upper Close are of considerable interest. In 1272 a great part of the church and the adjoining monastery were burned by the citizens, and many of the ecclesiastics killed. The Bishop's Palace north of the Cathedral, built by various prelates, is an extensive edifice. St. Andrew's Hall, anciently the nave of the Church of the Dominicans (Blackfriars), is a noble perpendicular structure, saved from spoliation by Henry VIII. through the public-spirited action of Augustine Steward, thrice Mayor of Norwich. It is now one of the handsomest civic halls in England; the walls are decorated with a number of valuable portraits, especially Beechey's Nelson, with others by Gainsborough, Lawrence, Opie, etc. The Guild Hall, succeeding the Tolhouse, where the king's tolls were paid, was built in 1413. In the Guild Hall corporation business is transacted.

The uninteresting Shire Hall (27 Sept. 1823) contains several portraits; in it the business of the shire, or county, is largely transacted. The Cavalry Barracks (1792, £20,000), Infantry Barracks (June 1888), Corn-Exchange (1861, £17,000), and Agricultural Hall (1882, £7,000) are commodious buildings adapted to their purposes. The Theatre (1826), often renovated, has no special features. The Grand Opera House (4 Aug. 1903), now the Hippodrome, is used for variety entertainments, a popular resort.

**Antiquities.**—This ancient city abounds in quaint relics of the past, and is notable for its antiques and curios. One of the show-places is Hercules and Samson House (Cubitt's), a large and very ancient mansion facing the Cathedral, the portico supported by ponderous figures of Hercules and Samson. It has great historical associations, its panelled rooms are filled with a choice collection of antique furniture, old china, and curios of every kind, freely open to visitors.

The Strangers' Hall, an ancient building, is a local museum in private hands, containing many interesting exhibits.

**Hospitals.**—The Norfolk and Norwich Hospital (1771, £21,000) is a fine institution, greatly extended of late years. There are near Norwich the extensive County and City Lunatic



## NORWICH — NORWICH UNIVERSITY

Asylums, and minor agencies for the insane. The Jenny Lind Children's Hospital, founded by the great songstress, 1853; new infirmary built by public subscription, opened by Prince and Princess of Wales, 30 June 1900.

**Libraries.**—The Norfolk and Norwich Subscription Library contains over 20,000 well-selected volumes; reopened after destruction by fire 2 Aug. 1899. The Free Library (16 March 1857, £6,500) contains over 44,000 volumes in circulation, with good reference and local collections.

**Churches.**—Apart from the Cathedral, Norwich, with its suburbs, has 40 Anglican churches, some quite new, two in ruins. The chief churches of the Independents, Baptists, and Presbyterians, are large and well attended. Before the Black Death in 1349 Norwich city had twice as many churches as to-day, and came to be called "the City of Churches."

A magnificent Roman Catholic church, opened 29 Aug. 1894, is still unfinished; the whole immense cost is borne by the Duke of Norfolk, Earl Marshal, and premier duke of England.

**Bridges and Parks.**—This city had five bridges in the 13th century; there are now 11. Formerly called "A City of Gardens," Norwich has an ornamental little park in Chapel Field Gardens; the Castle Gardens are very ornamental, and several of the churchyards are planted with flowers; there are several recreation grounds.

**Educational Facilities.**—Norwich grammar school occupies a charnel-house (Bishop Salmon 1325) transferred there, and to adjacent buildings at the Reformation. There are also the commercial school, divided from the grammar school (28 July 1862, £2,000), and a large Technical Institute for Science and Art and Technical Instruction (opened 1899, cost about £22,000). The public schools are numerous, fitted up with the best modern appliances.

**Government and Population.**—Communal self-government, under a Reeve, was granted by a charter of Richard I. in 1194, but in 1223 the government of the city was committed to four bailiffs, and so continued till January 1403-4, when Henry IV. granted that the city should be a county by itself, and the citizens were empowered to elect annually a mayor and two sheriffs. By a Municipal Reform Act (1835), one sheriff only was to be appointed. The city is now (1906) divided into 16 wards under the governance of a mayor, sheriff, 16 aldermen, and 48 councillors. Norwich first sent members to Parliament (2) in 1298, and still returns two members. Pop. (1811), 37,313; (1851), 68,706; (1881), 87,841; (1901), 111,728; (1906), 116,741.

**History.**—Many contradictory and mythical accounts have been given as to the beginnings of Norwich; until recently the accepted theory was that its first origin was the formation of the castle by some early Angle chieftain sailing up the river, piling up a great mound, and planting upon it a stockaded fort. But the latest authorities contend that the castle mound was thrown up by the Normans.

Between the 7th and 10th centuries East Anglia was the scene of continuous conflicts between the Saxons and the Danes. The first actual mention of the name of Norwich occurs

on coins minted there in the reign of Æthelstan (A. D. 925-941), and the earliest mention of it in any record is the statement in the *Saxon Chronicle* that in 1002 "Swegen came with his fleet to Northwic and wasted and burned the burh." Our first reliable glimpse of Norwich comes about 1050, when it could boast 1,320 burgesses, a number surpassed only by London and York, and was the residence of an Earl, East Anglia having been divided into four Earldoms by Canute (1017-1035). With the Norman Conquest came the building of the Castle, and in 1101 the dedication of the grand Cathedral by Losinga, first bishop of the diocese.

By a license from Henry III. the city was inclosed by a bank and a ditch (1253-1266); 41 years later a protecting wall, with towers and gates, was begun, which occupied 26 years in the building, and was accomplished by the munificence of Richard Spynk.

The most stirring events in Norwich arose from the Laborer's Revolt in 1381, and Kett's Rebellion in 1549. The former led by John Litester (the dyer) raided the city, but was soon routed by Despencer, the warrior-bishop of Norwich, and Litester was beheaded and quartered. Relentless taxation had infuriated the laborers and brought them to bay. Similar causes, also the inclosure of land previously of common right, and the suppression of the monasteries, stimulated Kett's rising. Robert Kett, a tanner, led some 20,000 men against Norwich, but, after some temporary successes, was defeated, leaving 3,500 dead upon the field, Kett himself being hanged from the parapets of Norwich Castle.

The Black Death, 1348-9, swept away a third of the inhabitants of Norwich, and the Plague of 1665-6 resulted in about 3,000 deaths.

This British Norwich is almost certainly the parent city of Norwich, Conn., for Miss Mary Perkins in her history of the latter (1895) says: "The Mohegan Indian fort may have suggested castle-crowned Norwich, perhaps, to the brothers Huntington, who are supposed to have emigrated from Norwich, England."

**Bibliography.**—*Early History.*—Blomefield, 'Norwich' (1745); 'Records of the City of Norwich' (Vol. 1, 1906), published by authority of the Corporation; Hudson, 'How the City of Norwich Grew into Shape' (1896). *Modern History.*—Rye's 'Norfolk' (1885); Mackie 'Norfolk Annals,' a chronological record (2 vols., 1901). JAMES HOOPER, Author of 'Guide to Norwich,' 'Nelson's Homeland,' etc.

**Norwich,** nôr'wîch, N. Y., village, county-seat of Chenango County; on the Chenango River, and on the Delaware, L. & W., and the New York, O. & W. R.R.'s; about 45 miles in direct line south by west of Utica and 35 miles north by east of Binghamton. It is the industrial and commercial centre of a productive agricultural region. The chief manufacturing establishments are blast furnaces, railroad shops, furniture factories, ribbon and glove factories, machine-shops and creameries. Perfumery, drugs, and patent medicines are also made and nearby are stone quarries. It has a free public library, a village hospital, and the county buildings. Pop. (1910) 7,422.

**Norwich University,** situated at Norwich, Vt. It was first chartered (1819) under the

## NORWICH CRESTED CANARY — NOSE

name of American Literary, Scientific, and Military College and was situated at Middleton; in 1829 it was moved to its present site; and the name changed to Norwich University in 1834. The usual collegiate courses are offered; and in addition courses in civil and chemical engineering and military science; military drill is also a part of the curriculum. The chief work of the university has always been in science and engineering, and in 1898 it was made the official State military school, and receives a State appropriation. The degrees of bachelor of arts and bachelor of science are conferred. In 1910 the annual income amounted to \$41,000; the students numbered 180, and the faculty 14.

### Norwich Crested Canary. See CANARY.

**Norwood, Mass.**, town in Norfolk County; on the New York, N. H. & H. R.R.; about 12 miles southwest of Boston. It has a large printing establishment, a railroad repair shop, foundry, tanneries, glue and ink factories, machine-shops, and furniture factories. The educational institutions are the Morrill Memorial Library which contains about 8,000 volumes and the public schools. The government is administered by annual town meetings. The town owns and operates the waterworks. Pop. (1890) 3,733; (1900) 5,480; (1910) 8,014.

**Norwood, Ohio**, city in Hamilton County; on the Pennsylvania, the B. O. & S., the Cincinnati, L. & N., and the Norfolk & W. R.R.'s; northeast of and adjoining Cincinnati. It was settled in 1804, incorporated as a village in 1898, and chartered as a city in 1903. It is a beautiful residential hill-suburb of Cincinnati, and also a manufacturing city of considerable importance. The chief industrial establishments (1903) are playing-card factory, which has 2,200 employees; the elastic book-case works, 1,200 employees; electric manufacturing works, 1,000 employees; washing-machine factories, 600; foundry, 200; piano factory, 400; millwork works, 125; tool factory, 125; iron works, 150; enamel sign works, 50; lithography works, 250; and other establishments employing fully 1,000 men. Several of the manufacturing companies have buildings of considerable architectural merit. Other notable buildings are the town hall, Enterprise Block, Knights of Pythias Hall, the bank building and the eight churches. The educational institutions are five public schools (fine buildings), one parish school, and there are branch libraries of the Cincinnati public library. The First National Bank has a capital of \$1,000,000. The government is vested in a mayor, a council of eight members, and a board of public service consisting of three members, all elected by the people. The population is mostly native born Americans, some are of German descent. Pop. (1900) 6,480; (1910) 16,185.

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**Nose**, that part of the face of man and the higher animals which is included in the mechanism of respiration, containing avenues for the passage of air to the lungs, and which also contains and accommodates the organs of smell; in a broader and looser sense, the muzzle. The nose in most animals is the most prominent feature of the face—least so in monkeys and lemurs, not much prolonged in the cats, but an important part of the prolonged muzzles of

other carnivora, and of the long-headed herbivorous animals generally. In several kinds of animals, otherwise widely diverse in structure and relationship, the fleshy part of the nose has been extended, through similarity of required service, into a more or less prolonged proboscis, as in the pigs, some shrews, certain seals, and, most prominently, the elephants. In these cases the nose performs other services than its usual functions, and becomes a tool for rooting, an organ of prehension, etc.

In structure, the nose consists of a series of bones of the face (see SKULL), together with certain cartilages, forming a tube or tubes holding the paired olfactory surfaces and nerves. The cavities of the nose are the two anterior nares, which open externally by the nostrils (in some of the lower animals, as the cetaceans, joined into a single one, the "blow-hole"); and the posterior nares, which are within the bones of the face and open interiorly into the mouth at the top of the windpipe. These cavities are separated by a more or less continuous cartilaginous partition called the septum, which is perforated by apertures for the transmission of blood-vessels and nerves. Occasionally the two nasal fossæ or cavities communicate with each other.

The muscles which are concerned in the movements of the nasal cartilages include the triangularis (or compressor) nasi, which arises by its apex from the superior maxillary bone, and is inserted into a fibrous aponeurosis spreading over the front ridge of the nose. The fibres of the muscle of one side may unite with those of the opposite and companion muscle. The depressor alæ nasi of each side also arises from the superior maxillary bone, and is inserted into the septum and posterior part of the alæ of the nose. The former of these two muscles appears to increase the breadth of the nose, and thus may open, dilate, or expand the nostrils; the action of the latter muscle is that of a true compressor of the nostrils, each of the depressors drawing its ala or side of the nostril downward. The levator labii superioris alæque nasi lies on the side of the nose, between the inner side of the orbit and the upper lip. When in action this muscle dilates the nose, raises the upper lip and alæ of the nose; its use being well seen in the expression of a derisive smile, and in the wrinkling of the skin at the angles of the nose and mouth.

The skin of the nose is of delicate and smooth character. The papillæ or minute elevations of the true skin in the neighborhood of the nose are described as being of smaller size than ordinary, while the supple skin or cuticle is of more than usually thin nature. The hairs of the skin are also of finer nature than in the other regions of the body; and the sebaceous or skin glands are very numerous, and possess short ducts, while their secretion is generally present in very abundant quantity.

There are three meat or compartments of the nose, which are formed in the outer wall or side of each of the nasal cavities by the turbinated bones. These compartments are of unequal size, and they communicate by apertures with certain spaces known as air-cells or sinuses, existing in the frontal, sphenoid, superior maxillary, and ethmoid bones. The upper or superior meatus is the smallest compartment, and occupies the posterior part of the nasal wall. It

## NOSE AND THROAT

communicates with air-cells known as the posterior ethmoidal and sphenoidal sinuses. The middle meatus is a little larger. It communicates anteriorly through a passage or infundibulum with the anterior ethmoidal and frontal sinuses. The inferior meatus is the largest cavity, and occupies the greater part of the outer nasal wall. Into the front portion of the inferior meatus the nasal duct opens; this canal conveying the tears or lacrimal secretion from the eye to the nose. (See EYE.) Posteriorly to the extremity of the inferior meatus the aperture of the Eustachian tube, leading from the ear, may be seen.

The mucous membrane lining the nostrils and nasal cavities is also known as the pituitary membrane. It extends throughout the nasal sinuses, into the pharynx, into the nasal ducts and orbits, and through the Eustachian tubes, into the tympana and mastoid cells of the ear. (See MUCOUS MEMBRANE.) In the upper part of the nose, corresponding to the upper and middle turbinated bones and the ethmoidal portion of the septum—and termed the olfactory region, from the distribution at this part of the olfactory nerves—the mucous membrane has a covering of epithelial cells of the columnar variety, but non-ciliated. And beneath this layer, and also between the columnar epithelial cells, nucleated or olfactory cells are found. These latter cells form the terminal points as it were of the delicate ultimate filaments of the olfactory nerves, or the nerves of smell (see NOSE AND THROAT); and in this way the odoriferous particles drawn into the nostrils, and brought in contact with these cells, stimulate through them the olfactory nerves, and produce the sense or impression of smell.

The study of the comparative anatomy of the nasal organs shows us that man possesses a sense of smell greatly inferior in very many instances to that possessed by the lower animals. The distribution of the olfactory nerves in man is of a very limited nature when compared with what obtains in such animals as the dog, sheep, etc. And among these lower forms great differences are apparent in the kinds or qualities of odors most readily perceived or appreciated. The carnivorous mammals will in this way be most susceptible to the odors of other animals, and the herbivorous forms to those of plants.

**Nose and Throat, Diseases of.** In treating of the various aspects of the subjects here naturally combined, attention is first drawn to matters of anatomical structure, and the parts first presented for consideration are the anterior nasal cavities. These cavities mark the commencement of a continuation of passages which extend from the external orifices of the nose to the lungs. These are subdivided into anterior nares, nasopharynx, pharynx, and larynx. This series of continued passages constitute what is known as the respiratory tract. (See RESPIRATION.)

The anterior nares are the two nasal cavities (nostrils) separated by the nasal septum. The septum also serves to define this space, since its posterior border marks the dividing line between the anterior and posterior nares. Each naris consists of a nearly horizontal floor, an internal or septal wall, and two side walls tending to converge in the upper portion, leaving a narrow and irregular roof. The external wall

serves as an attachment for the series of the three turbinated bones.

**Turbinated Bones.**—These are scroll-like processes of bone attached to each lateral wall of the nasal cavity, one over the other, and projecting well into the lumen of the cavity. In the order of location they are known as the superior, middle, and inferior, the inferior being the largest and the longest of the three. The spaces between these bones, looking antero-posteriorly, are known as the superior, middle, and inferior meatuses.

**The Nasal Septum.**—The septum divides the anterior nasal cavity antero-posteriorly. It is partly cartilaginous and partly bony, the bony portion being made up of processes of the ethmoid bone and the vomer.

**Accessory Sinuses.**—Four groups of accessory sinuses communicate with the anterior nares. They are in pairs and are named as follows: The maxillary sinuses or antra of Highmore, the frontal, the ethmoidal, and the sphenoidal. The maxillary sinuses are situated one in each superior maxillary bone, for the most part occupying the space in the prominence of the cheek. They are irregular cavities, rather pyramidal in shape. The roof of the sinus constitutes the floor of the orbit, its floor being the alveolar process. Occasionally the teeth project into this cavity. The maxillary sinus opens into the nasal cavity in the middle meatus through a small tortuous canal, known as the ostium maxillare.

The frontal sinuses are located between the two tables of the skull, just over the orbit, and give rise to the prominence over each eye. They communicate with the nose.

The ethmoidal, better named ethmoid cells, are in series, and are located in the middle anterior and posterior portions of the ethmoid bone. These open into the nasal cavity.

The sphenoidal sinuses are located in the body of the sphenoid bone. They are each about the size of a bean, and open into the superior meatus. The opening of the lacrimal or nasal duct which leads from the lacrimal sac to the nose is in the anterior portion of the inferior meatus. The bony walls of the anterior nares together with the sinuses above described are completely covered by mucous membrane. This membrane is richly supplied with blood-vessels, lymphatic nerves, and glandular structures. The olfactory nerves descend through the cribriform plate of the ethmoid bone and cover the upper surface of the septum, the superior and middle turbinated bones. Most physiologists regard the function of the nasal cavities as three-fold in character, relating to respiration, olfaction, and phonation. The secretions are supposed to have a bactericidal power.

**Rhinoscopy.**—This term denotes the methods used for examining the nasal passages, either through the anterior nares or the post-nasal space. The examinations may be made by direct or by reflected light. Various methods have been employed, the commonest being the student-lamp or ordinary gas-jet, with McKenzie's bull's-eye condenser. This, together with a reflecting head-mirror, enables the examiner to throw a light directly into these cavities. An electric head-light which does away with the use of a burner or indirect apparatus may be employed. When an anterior naris is examined the nostril is opened wide by the means

## NOSE AND THROAT

of a nasal speculum. For examining the posterior naris a tongue-depressor and small hand-mirror must also be used.

**Catarrh.**—The term catarrh is used quite generally to designate the varieties of inflammation of the upper respiratory tract. This is contrary to the strict meaning of the term. It may, however, be used to define certain varieties of inflammation, which are no less distinctly recognized.

**Inflammation.**—The varieties of inflammation in the nasal cavity include: 1. Catarrhal inflammation, of which the acute variety is a simple inflammation of the nasal mucous membrane resulting from irritants, exposure to cold, or from infections (measles, scarlet fever, typhoid, diphtheria, grip, etc.), while rheumatism and gout sometimes induce catarrhal inflammations of the upper respiratory tract. Chronic catarrhal inflammation may result from a series of acute attacks, but is more particularly found as a local indication of systemic diseases such as syphilis, Bright's disease, gout, rheumatism, malaria, etc. 2. Membranous inflammation, of which there are three varieties: (a) croupous or pseudomembranous, an exudate without material organization and not due to specific bacteria, and which may be produced by escharotics or infectious fevers; (b) fibrinoplastic inflammation, which is characterized by the formation on the surface of the membrane of plastic material that seems to organize in layers, but is nonbacterial in origin; (c) diphtheritic inflammation, a more deep-seated exudate due to a specific germ, the Klebs-Löffler bacillus, or *Bacillus diphtheria*.

Unlike the foregoing this false membrane when removed leaves a bleeding surface, showing that ulceration exists, which extends at least through the basement membrane.

3. Hemorrhagic inflammation, a violent inflammation of the mucous surface, characterized by interstitial hemorrhage.

4. Gangrenous inflammation, a type of inflammation which sometimes follows the acute infectious diseases in children. It may be due to burns, scalds, etc.

**Specific Inflammations (Chronic Infectious Inflammations; Specific Granuloma).**—These include actinomycosis, glanders, leprosy, syphilis, tuberculosis (q.v.), and rhinoscleroma, which is characterized by excessive thickening and swelling of the skin and mucous membrane of the nose, and is supposed to be due to *Bacillus rhinoscleromatis*.

**Nasal Bacteria.**—Owing to the peculiar construction and functions of the nasal cavities, together with the moist condition of the membrane, bacteria to a greater or less extent accumulate. The secretions of the nose and nasopharynx are supposed by most bacteriologists to possess considerable germicidal influence, as may be instanced by the fact that they are found in much larger numbers in the anterior nares than in the rhinopharynx. It may also be noted that even the more virulent types, especially the *Staphylococcus pyogenes*, *Micrococcus pneumonia* (Frankel), *Bacillus tuberculosis*, Friedlander's pneumococcus, Klebs-Löffler bacillus (diphtheritic), and the streptococcus may be found and still not result in the development of the specific diseases of which they are supposed to be the causative factors.

**Diseases of the Anterior Nasal Cavities.**—Of these one of the most frequent is acute rhin-

itis (acute nasal catarrh, acute rhinorrhoea, catarrhal rhinitis, cold in the head, snuffles), an acute inflammation of the lining membrane of the nasal cavities, supposed to be the result of lowered vitality, confinement in overheated rooms, and prolonged mental strain, to which is added exposure to draft or sudden chilling of the body. Contributing causes may also be mentioned, such as deviation of the cartilaginous septum, stenosis, rheumatism, gout, chronic hypertrophy, and unsuitable clothing. Irritant drugs, the inhalation of dust, clippings, etc., may be considered as exciting causes.

Simple chronic rhinitis (chronic blennorrhoea, chronic nasal catarrh, chronic coryza, chronic rhinorrhoea) is a chronic inflammation of the nasal mucosa characterized by infiltration of the tissues and resulting from changes in the secretions and repeated acute attacks. In its hyperplastic form, owing to the increase of connective tissue in the nasal mucosa, it is accompanied by more or less nasal obstruction.

**Ozena.**—This is usually spoken of as a disease, but in reality is only a symptom. The conditions giving rise to its characteristic stench are not fully understood. By some it is considered to be simply a decomposition of the various fatty acids set free from certain intranasal inflammations. A more generally accepted opinion, however, is that the retained altered secretions undergo a putrefactive process as a result of the presence of saprophytic bacteria. The conditions usually present in the nose are those of atrophy and disease of the accessory sinuses. The odor is mainly confined to the large masses of crusts imbedded in the nasal cavities.

**Atrophic Rhinitis.**—This disorder, also known as atrophic catarrh, dry catarrh, dry rhinitis, fetid rhinitis, nasopharyngitis, ozena, and rhinitis sicca, may be described as atrophy of the nasal mucous membranes, accompanied by lessening of both the blood-supply and glandular secretion. The atrophic state has usually been preceded by a succession of inflammations accompanied by more or less hypertrophy of the tissues. In a large proportion of atrophic cases ozena is present.

Purulent rhinitis is a rare condition resulting from direct infection, and often mistaken for purulent conditions of the accessory cavities.

Nasal hydrorrhoea is an obstructed nasal condition accompanied by an excessive flow of watery fluid from the nose, probably of reflex origin.

**Nasal Syphilis.**—A disease also called specific catarrh, specific rhinitis, and syphilitic rhinitis. It is an intranasal manifestation of syphilis, usually of the tertiary variety, accompanied with more or less necrosis of both soft tissue and bone. Occasionally the nasal mucous membrane may become the seat of the initial lesion. The intranasal lesions of the tertiary stage are severe and extensive and may involve the cartilaginous septum or the bony framework of the nose, resulting often in serious and extensive deformity. Wherever there are masses of necrosed bone the odor is exceedingly offensive, and frequently large pieces of broken down bone may be removed *en masse*.

Lupus (q.v.) is a skin-disease of which there are two distinct forms.

Furunculosis (phlegmonous rhinitis) is the

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formation of abscess in any part of the nasal cavities.

**Ulcers.**—Small ulcers may form in various portions of the nasal cavity, but are usually found upon the septum, and result from foreign bodies, picking of the nose, and from a general systemic disturbance like diabetes. Malignant growths occur in the nose and do not differ essentially from those found elsewhere in the body. Infected ulcers, when occurring in nasal cavities, are due to some specific form of disease like syphilis, glanders, diphtheria, scarlet fever, smallpox, typhoid fever, or typhus fever, the type depending upon the nature of the accompanying disease.

**Neuroses.**—Neurosis of olfaction (smell) is a perversion of olfaction, a perception of imaginary odors frequently amounting to hallucination. Hyperosmia, overacuteness of olfaction, is supposed to be due to impairment of nerve-force. See ANOSMIA; SMELL.

Sneezing is a forcible and audible spasmodic expulsion of air through the nose and mouth caused by inhalation of irritating substances or by irritation of the vasomotor centres. See HAY FEVER.

**Non-Inflammatory Diseases.**—Of these, one of the most common is nosebleed (q.v.). Several varieties of foreign bodies are occasionally found in the anterior nasal space. Rhinoliths are developments of hard substances in the nasal mucosa formed from the deposit of mineral salts. Various animate foreign bodies may be found in the nose, such as insects, maggots, and intestinal worms. Of other foreign bodies, those placed in the nostrils by malingerers and children form the greater part, and consist chiefly of buttons, beans, peas, seeds, rags, etc.

**Neoplasm of the Upper Respiratory Tract.**—Non-malignant neoplasm (papilloma) is a benign wart-like growth made up of hypertrophied papillæ, appearing rarely in nasal cavities, but occasionally seen in the pharynx and larynx. Adenoma is a benign tumor made up of connective tissue enclosing a large space filled with blood. Enchondroma in the nasal passages, is a cartilaginous growth, sometimes called chondroma, and is an offshoot from the cartilaginous septum. Exostosis is a bony growth projecting outward from the surface of the intranasal bony framework. Myxoma (nasal polypus) is the lowest grade of adult connective-tissue tumor; being a soft translucent growth made up of connective tissue and capillary vessels enclosed in a jelly-like matrix. They are usually pedunculated, multiple, and sometimes of large size; grayish in color, translucent, and have a small surface. They give rise to symptoms of intranasal pressure and obstruction, asthma, laryngeal cough, impairment of smell, and excessive watery discharge. As a rule the growth is associated with diseases of the accessory sinuses.

**Malignant Tumors.**—Carcinoma may have its origin in any part of the upper respiratory tract. It rapidly assumes grave proportions, and is amenable to operative interference only during incipency. The same may be said of sarcoma, which is a highly malignant tumor, having its origin in the deep connective tissue and gradually spreading to the mucous surface. It is nodulated and fungoid in appearance and tends to ulcerate in the later stages. See TUMOR.

**Diseases of the Anterior Nasal Cavities.**—Owing to the prominence of the nose and its

peculiar anatomical conformation, the septum becomes peculiarly liable to injuries and malformations, the most common of which is deviation or deflection. A deviated or deflected septum (usually limited to the cartilaginous portion) is a permanent change from the perpendicular to varying deformities. The deformities assume various shapes, with an occasional offshoot of a cartilaginous mass heretofore described as enchondroma. These often result in severe intranasal obstruction and require radical operative interference for relief. Synechia is a cartilaginous or fibrinous band extending from the septum to the nasal wall. A synechia may sometimes form between the turbinates. Septal ulcerations are usually due to picking the nose, the desire for which may be induced by irritants, foreign bodies, and the inhaling of poisonous gases. They may also be syphilitic in origin. Septal perforations are openings through the cartilaginous septum. They are of varying sizes, and are due to extension of ulceration. Abscess of the septum is a collection of pus in the septal tissues, due to injuries or general systemic diseases. Depression of the nasal cartilage is a nasal deformity following extensive loss of septal tissue or of nasal bones, usually due to syphilis or injury.

**Diseases of the Accessory Sinuses.**—The maxillary sinuses are occasionally the seat of purulent inflammation, which may be acute or chronic. The collection of pus gives rise to pain, a sense of fullness, and discharge into the nasal cavity of the affected side. The condition is caused either by carious teeth, infectious rhinitis, or from the introduction of infection through abnormal communications from other diseased sinuses.

Transillumination is a method of diagnosis of antral disease, by means of which, having the patient in a dark room, a strong electric light is placed in the mouth and a comparison of the illumination made with the opposite side. Acute cases frequently recover by local treatment, but chronic cases usually require operative measures. The antrum may also become the seat of both benign and malignant growths.

**Diseases of the Ethmoidal Cells.**—These groups of cells, located in the ethmoid bone and communicating with the nasal cavities, are subject to both acute and chronic inflammatory and purulent diseases, the most common being the acute catarrhal inflammation occurring with general purulent rhinitis. The purulent form may occur on one or both sides, and may be associated with a suppurative condition of other accessory sinuses. When far advanced, it results in an enlargement of the middle turbinated bones, the walls of which become cystic, forming, with the broken-down tissues of the ethmoid, large cysts filled with pus or polypoid degeneration.

The sphenoidal sinuses are less frequently the seat of disease, although they may be the seat of the same diseases heretofore described as occurring in the other sinuses.

The anatomical relation of the frontal sinuses to the nasal cavities renders them liable to the development of both acute and chronic inflammatory conditions, purulent infections, and tumors.

Catarrhal inflammation, both acute and chronic, with its attendant supra-orbital pain and sense of weight and fullness in the fore-

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head, is occasionally present in connection with the same condition in the nasal cavities. Acute suppurative inflammation (empyema) is an acute suppuration brought about by the introduction of infection from the nose through the infundibulum. When long continued, the purulent process takes on the form of chronic purulent inflammation, in which there may be more or less necrosis of the bony walls and the development of polypoid degeneration. The severest forms are usually quite curable by means of operation.

**Nasopharynx.**—The nasopharynx is that section of the upper respiratory tract between the posterior border of the vomer and the level of the soft palate. The nasopharynx may be the seat of the following diseases: (1) acute nasopharyngitis (acute postnasal catarrh, acute rhinopharyngitis); (2) chronic nasopharyngitis; (3) atrophic pharyngitis (see *Atrophic Rhinitis* above); (4) hyperplastic nasopharyngitis; (5) specific inflammations (see *Pharynx* below, also *PHARYNX*, a separate article); (6) adenoid vegetations (see *Tonsils* below).

Acute nasopharyngitis is an acute inflammation of the mucous membrane lining the nasopharynx, usually accompanied by similar inflammations in the nose, pharynx, and larynx. Chronic nasopharyngitis is a chronic catarrhal inflammation resulting usually from repeated acute attacks and with the same causal relations. It is characterized by the presence of tenacious mucus, with more or less continuous efforts on the part of the victim to "hawk" and clear the throat. In the later stages the secretion shows a tendency to become thick, forming scabs and inspissated masses. This affection may result from the inflammation of irritating gases. Hyperplastic nasopharyngitis is a chronic inflammation resulting in the development of connective tissue in the mucous membrane.

**Pharynx.**—The pharynx is that portion of the upper respiratory tract bounded above by the soft palate and below by the upper borders of the larynx and oesophagus. The uvula, when normal, should be about  $\frac{3}{4}$  of an inch long. It is occasionally bifid, and when it is greatly relaxed or enlarged the condition is described as elongation of the uvula. The uvula may be subject to inflammations, ulceration, tuberculosis, syphilis, and oedema. The same may be said of the soft palate, which is also subject to adhesions, in which there is an attachment or adhesion between the soft palate and the posterior wall of the pharynx. Adhesions of this character are due to the ravages of syphilis.

**Tonsils.**—The tonsils are a series of glands known as (1) the pharyngeal or Luschka's tonsil, also called adenoid vegetation; (2) the faucial tonsils, located on either side of the pharynx between the faucial pillars; (3) the lingual tonsils, a series of glands at the base of the tongue. Taken as a whole, they have been known as Waldeyer's ring. A visible hypertrophy or enlargement of any one of the series is usually accompanied by similar enlargement of the others. They form a part of the normal anatomical structures of the locality and, when diseased, call for operative interference.

Adenoid vegetation in the vault of the pharynx is an enlargement or hypertrophy of the glandular structures of the vault, due to disease. The presence of this condition is indicated by interference with nasal respiration, resulting in

mouth-breathing, especially at night, snoring, restlessness, "dead" voice, and often with considerable arrest in the progress of physical development. With these symptoms are frequently found narrowing of the nasal orifices, attacks of middle-ear suppuration, and narrowing of the chest-walls. The causes are variously described as climatic, inherited tendency, confinement in badly ventilated quarters, and neglect. The masses are found in the vault and on the posterior wall of the nasopharynx. Enlargement of these glands is considered to be extremely detrimental to child-life, and complete removal by operation offers the only means of cure and should always be done.

The faucial tonsils are located between the anterior and posterior faucial pillars, and normally are not visible to the eye. The lymphatic structure, however, is liable to pathological changes resulting in enlargement or hypertrophy. The enlargement may be slight, but the tonsils may become so much enlarged that they meet in the median line of the pharynx. The enlargement becomes much aggravated during the attacks of the various acute inflammations which may occur in this region. The faucial tonsils are subject to acute inflammation occurring with general pharyngitis.

Tonsillar and peritonsillar abscess (quinsy, phlegmonous tonsillitis) is a suppurative inflammation of the tonsil, accompanied by severe pain, fever, and swelling in the tonsillar or peritonsillar region, resulting in formation of abscess.

Follicular tonsillitis (lacunar and cryptic tonsillitis) is an acute inflammation of the tonsil attended with small fibrinous exudates in the crypts. It is accompanied by constant pain, chills, high temperature, and is supposed to be due to exposure to cold, climatic changes, and lowered vitality.

The causes of hypertrophied tonsils are chronic inflammation, inherited diathesis, gouty or rheumatic conditions, climatic influences, and the infectious diseases of childhood. The condition is accompanied by interference with respiration, more or less difficulty in swallowing, involvement of the Eustachian tube, anæmia, languor, and retarded physical development, all these symptoms being aggravated by the recumbent position. Tonsillotomy should be performed whenever there is sufficient enlargement to interfere with deglutition, respiration, or phonation. The instrument generally used for the removal of hypertrophied tonsils is known as the tonsillotome.

Caseous tonsillitis is a condition resulting from acute or chronic inflammation of the tonsils, in which the crypts show a tendency to fill up with various secretions. These masses show a tendency to ferment and form small foul-smelling caseous masses, which eventually squeeze out of the crypts. They may be removed by the means of a curet.

Mycosis of the tonsil and pharynx is an affection characterized by the development of small yellowish-white, clearly defined masses forming around the tonsillar crypts and frequently extending over the surface of the pharynx and the glands at the base of the tongue. It is supposed to be caused by *Leptothrix buccalis*.

Fish-bones, pins, and other foreign bodies occasionally find lodgment in the tonsil-crypts.

Lingual tonsil is made up of a mass of



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adenoid tissue located between the circumvallate papillae at the base of the tongue and the attachment of the epiglottis.

*Disease of the Pharynx* (acute inflammatory diseases of the pharynx, acute catarrhal pharyngitis), an inflammatory process, catarrhal in character, results from exposure to cold, and is usually attended with a like condition in the nose and larynx. It may also be due to gastric disorders and lowered vitality. There are many contributing causes, among which may be mentioned the exanthemata, bad ventilation, bad hygiene, insufficient clothing, overindulgence in alcohol and tobacco, and the inhaling of noxious gases. The disease is indicated by a certain dry painful condition of the pharyngeal walls, congested vessels, swelling, and sometimes œdema. Later on the dryness gives way to a more or less profuse secretion gradually becoming more tenacious and mucopurulent.

Infective pharyngitis (hospital sore throat, phlegmonous pharyngitis) is an inflammatory condition, attended with more or less exudate, occurring in individuals who are exposed for a prolonged period to septic influences. It is frequently found in the throats of physicians and nurses who care for diphtheria and scarlet-fever patients.

Croupous or simple membranous pharyngitis is an inflammation of the pharynx or tonsils attended with the development of a false membrane without the presence of any specific germ. Clinically the disease resembles diphtheria, but is in no sense to be considered as the same. (See DIPHTHERIA). A positive diagnosis can be established only by bacteriological examination.

*Ludwig's Angina*.—This is a suppurative cellulitis occurring in the tissues of the neck, due to secondary infection from within the throat. Diphtheria, scarlet fever, and grip may be mentioned as exciting causes.

*Chronic Inflammatory Diseases*.—Simple chronic pharyngitis (clergyman's sore throat) is an inflammation of the pharynx resulting either from frequent acute inflammations or from overuse of the voice. Public speakers and singers are peculiarly liable to its development. It may also result from lesions of the liver, kidneys, lungs, and heart, or from the use of stimulants. The marked symptoms are hyperæmia or congestion, with dryness, hoarseness, and a feeling of throat-tire.

Follicular pharyngitis (granular pharyngitis) may be defined as an inflammation in which the granular structures of the pharynx become chiefly involved. It is accompanied by hoarseness, irritation, and cough, together with the appearance on the posterior wall of small granular enlargements. The disease is supposed to result either from voice-strain or improper vocalization.

Atrophic pharyngitis (dry pharyngitis, pharyngitis sicca, atrophic pharyngitis) may be defined as a chronic inflammation resulting in pathological alterations in the structure of the mucous membrane of the pharynx and impairment of the muciparous glands. The disease is attended therefore by perverted secretion, with a burning, itching sensation in the throat, and extreme dryness. It is usually accompanied by atrophy of all the membranes of the upper respiratory tract.

Rheumatic pharyngitis (gouty sore throat,

rheumatic sore throat) is an affection that may be acute or chronic, and is due to the presence of some irritant in the blood. The uric-acid diathesis may be considered an exciting cause, and the disease responds to antirheumatic or antigout treatment.

Tuberculosis of the pharynx is a rare involvement, always secondary to pulmonary tuberculosis. Its presence is indicated by the formation of small tubercles upon the soft palate or pillars of the fauces. A positive diagnosis may be made by microscopical examination of the secretions.

*Syphilis*.—All three forms of syphilitic lesions may appear in the pharynx. The primary lesions are occasionally found upon the tonsils or other surfaces of the pharynx in the form of chancre. The mucus-patch is usually present at some period during the history of every case. The tertiary lesion or gumma may also develop in any of the pharyngeal structures often resulting in extensive ulceration and adhesion.

*Glanders*.—An infectious disease due to the *Bacillus mallei*, and communicated to man from animals, usually horses.

*Retropharyngeal Abscess*.—A suppurative inflammation in the posterior wall of the pharynx resulting in the development of abscess, which may burrow upward or downward, causing serious danger to life. The primary infection is usually due to inherited tuberculosis or syphilis.

*Foreign Bodies in the Pharynx*.—The exposed location of the pharynx, with its irregular surfaces, renders it peculiarly liable to the lodgment of foreign bodies. Among those rather frequently observed are fish-bones, pieces of other bone, shells, coins, pins, needles, sharp objects of various kinds, false teeth, etc.

*The Larynx*.—That section of the upper respiratory tract which occupies the space between the root of the tongue and the upper end of the trachea is called the larynx (q.v.). It is subject to a variety of diseases, among which are malformations and deformities. Congenital deformities in the larynx are rare. Congenital stenosis is a narrowing of the calibre of the larynx due to the formation of webs or bands stretching across the interior. Acquired stenosis is due to cicatricial contraction, traumatism, or syphilis. Tubercular ulceration may also be mentioned as a cause of stenosis of the larynx.

Acute catarrhal laryngitis (spurious croup) is an acute inflammatory process involving the mucous membrane of the larynx, and attended with hoarseness, dryness, and slight dyspnoea. The disease is caused by cold, exposure, gastrointestinal disturbances, nasal obstruction, bad ventilation, inhalation of irritating gases, and overuse of the voice. There is usually slight fever, cough, and in the later stages considerable expectoration.

Acute laryngitis in children (spasmodic croup, false croup) does not differ in etiology and pathology from ordinary acute laryngitis. The symptoms, however, are much more marked. The small calibre of the larynx in childhood, together with the greater elasticity of the tissues, renders the condition more serious. The engorgement is more rapid, and the symptoms of suffocation rapidly develop. The peculiar stridulous breathing, with frantic respiratory efforts and a hoarse barking cough, gives the disease an appearance of unusual severity.

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The disease usually continues for three days, and is relieved by steam-inhalations, emetics, and laxatives.

For spasm of the glottis see LARYNGISMUS STRIDULUS.

Acute epiglottitis, inflammation of the epiglottis, is rarely entirely local except when due to swallowing an irritating substance. It is usually associated with inflammation of contiguous membranes. The chief symptom is a burning, smarting sensation, with a tendency to edema.

Edema of the larynx is an acute inflammation of the larynx accompanied by serous infiltration of the tissues, and resulting in marked interference with respiration.

Rheumatic laryngitis (laryngeal rheumatism, gouty sore throat) is an acute laryngitis directly traceable to a rheumatic or gouty diathesis.

Membranous laryngitis (true croup, membranous croup, diphtheritic croup, fibrinous croup, croupous laryngitis, laryngeal diphtheria) is an inflammation of the mucous membrane lining the larynx, manifesting the appearance of true diphtheria, but usually without the presence of Klebs-Löffler bacilli. Various forms of pathogenic bacteria are usually present. It may occur at any season of the year, and clinically it approaches so nearly to diphtheria that a positive diagnosis is most difficult. Many observers believe the condition to be exceedingly rare, and that true diphtheria is nearly always present wherever true membrane is found in the larynx.

Laryngeal diphtheria, without the presence of membrane in the pharynx or nose, sometimes occurs, the symptoms being quite similar to membranous laryngitis. The characteristic odor, however, is usually present, and the Klebs-Löffler bacilli may be found.

Hemorrhagic laryngitis may occur as a result of acute laryngitis, or from syphilis, tuberculous or malignant disease, or from rupture of a blood-vessel.

Simple chronic laryngitis (chronic catarrh of the larynx) is an inflammation involving both the superficial and deeper layers of the mucous membrane, with more or less of tissue-changes. The disease is supposed to result from repeated acute attacks. A subacute variety may be mentioned, but it cannot be clearly defined beyond stating that it is the commencement of the chronic form. Among other causes are the inhalation of irritating gases or dust, nasal obstruction, and improper use of the voice. The marked symptoms of this condition are hoarseness, a tickling sensation, with a tendency to clear the voice, slight cough, with considerable secretion, and occasional loss of voice.

Dry laryngitis (laryngitis sicca, atrophic laryngitis, laryngeal ozæna) is always associated with a similar condition in the nose and nasopharynx, the symptoms of which have all been described.

Anæmia of the larynx, when marked, is usually a local manifestation of general anæmia.

Singers' nodules (chorditis tuberosa, trachoma of the vocal cords) are new-growth formations appearing on the margin of the vocal cords and usually at the junction of the middle and anterior thirds. They are small oval masses, sometimes developing upon both cords. While resulting from inflammation, the exciting

cause is no doubt the improper use of the vocal apparatus. There is marked interference with phonation and sometimes complete loss of voice. Treatment consists either of rest or the adoption of a system of vocal exercises which bring other series of muscles into activity. Local astringent applications have been employed.

*Syphilis of the Larynx.*—Both secondary and tertiary lesions of syphilis may appear in the larynx, mucus patches, however, being somewhat rare. The tertiary stage is of comparative frequency, and is manifested by the development of gummata, with destructive ulceration and subsequent cicatrization.

*Tuberculosis of the Larynx.*—This disease, also called consumption of the larynx, consumption of the throat, laryngeal phthisis, and tubercular laryngitis, is a specific inflammation of the larynx, the direct result of the tubercle bacillus. Tuberculosis of the larynx is rarely, if ever, a primary affection, and usually occurs as a manifestation of general tuberculosis. It begins with the development of minute miliary tubercles in the larynx, which eventually result in large swellings of the arytenoid cartilages. These subsequently break down, forming large ulcerations. Great suffering results, with dysphonia, dysphagia, continuous irritation of the larynx, progressive hoarseness, and irritating cough with excessive expectoration. In the late stages hemorrhage may occur. This form of tuberculosis is rapidly fatal, with but little hope of the patient's recovery.

*Foreign Bodies in the Larynx.*—Accidental entrance of foreign bodies into the larynx occasionally occurs. Foreign bodies usually enter during the process of swallowing, speaking, or breathing. The resulting danger depends much upon the character and size of the foreign body, and also upon its location. Liquid food and even small portions of solid food, are usually dislodged with little difficulty unless the entire calibre of the larynx is shut off. Foreign bodies may usually be seen by the ordinary methods resorted to for examining the interior of the larynx. They are removed by extraction by way of the mouth and larynx, or by external operation. Unfortunately the masses are sometimes drawn beyond the larynx into the bronchial tubes with fatal results.

*Neuroses of the Larynx.*—Of the various laryngeal symptoms sometimes resulting from impaired nerve-supply or from brain-lesions is spasmodic cough. This occurs more frequently in persons of neurotic type, although it may be of reflex origin. Anæsthesia, paræsthesia, and hyperæsthesia of the larynx may be mentioned under this type of affections.

Hysterical aphonia is usually described as a sudden and complete loss of voice, occurring in unmarried females. The immediate existing cause is usually shock, fright, anger, or some other sudden emotion. The condition may remain for some time, and recovery may be sudden and unexpected and without treatment.

*Laryngeal Vertigo.*—This is a neurosis in which the dominant symptoms are a sudden strangling cough with vertigo and momentary loss of consciousness. It is a rare affection, and is usually associated with acute or chronic inflammation of the larynx, strongly influenced by fatigue or nervous excitement. The disease quickly responds to treatment.

*Paralysis of the Vocal Cords.*—Temporary

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interference with the nerve-supply of the various muscles controlling the larynx, especially from local causes, is not infrequent. The paralysis following diphtheria and accidental poisoning is typical. A more severe form results from pressure from aneurism, cancer, phthisis, and syphilis. But lesions of the brain are by far the most destructive in results. Paralysis in this location may be either motor or sensory. Bilateral paralysis of the superior laryngeal nerve is both motor and sensory in character. The gravity of these conditions depends upon the cause. Bilateral abductor paralysis, on account of the approximations of the vocal cords without the muscular power to separate them for proper inhalation, is dangerous to life, inasmuch as a fatal attack of dyspnoea may occur at any time.

*Intubation of the Larynx.*—This process was devised and perfected by the American physician, Joseph O'Dwyer. It consists in placing a hollow tube within the larynx for the purpose of relieving dyspnoea. Intralaryngeal tumors sometimes tend to occlude the lumen of the larynx, and intubation is resorted to for the relief of the attendant dyspnoea. Intubation also serves as a method of relief in cases of laryngeal stricture. The operation is never attempted unless the patient's life is threatened by occlusion of the larynx or sudden spasm. The most common disease giving rise to the necessity for intubation is diphtheritic laryngitis.

*Tracheotomy.*—An operation whereby an external opening is made into the trachea below the larynx, through which a tube known as the tracheotomy-tube is inserted. It is performed for the relief of any obstruction to breathing. The site selected for entrance into the trachea may be high or low according to the nature and location of the obstruction.

*Operations on the Larynx.*—Thyrotomy consists of splitting the thyroid cartilage in the median line for the purpose of opening the larynx and removing growths or foreign bodies. Laryngectomy is an operation for the complete removal of the larynx, and is performed only in case of malignant growth. In cases where only part of the larynx is removed it is called partial laryngectomy. An artificial larynx is an instrument which in certain cases may be introduced after a laryngectomy, and which serves to fulfil some of the functions of the larynx. Consult: Kyle, 'Diseases of Nose and Throat' (1900); Bosworth, 'Diseases of Nose and Throat' (1889); Knight, 'Diseases of Nose and Throat.'

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**Nose-bleed**, hemorrhage from the nose; epistaxis. This is the most frequent form of bleeding from a mucous membrane. It may be caused by direct injury, as by a blow upon the nose, a scratch within the nostril, etc., or may result from ulceration or other morbid growth in the nasal cavity. It is most common in children and young adults. When an active hemorrhage, it may be preceded by a feeling of tension and heat in the nostrils, pain in the forehead, giddiness, buzzing in the ears, flushing of the face. These symptoms are seldom all present in the same case, and in many instances the flow of blood is not preceded by any apparent disorder.

Nosebleed may also be of a passive character, as when due to a morbid state of the blood, for example, in typhoid fever, scarlet fever, purpura, scurvy, etc., or to obstruction of the circulation by disease of the heart and liver. In persons advanced in life it must be more cautiously interfered with than in the young. If the person so affected is plethoric, the hemorrhage is evidently of an active character, and is a natural relief, usually it will stop by the clotting of the blood in the nostril, or upon pressure of the wing of the nostril against the nasal septum. It may, however, go to an extreme extent, and require other means for checking. There are many methods of affecting this, but the application of cold water, snow, ice, etc., to the forehead, spine, or other parts of the body is the most general. Raising both arms suddenly above the head has been said to stop the flow quickly; or a small quantity of solution of alum, as strong as it can be made, may be thrown up with a syringe, or a piece of linen soaked in the solution may be stuffed up the nostril. From 10 to 15 drops of dilute sulphuric acid may be given in water at intervals, according to the nature and persistence of the attack. The application of cotton or a sponge, tannin, alum, etc., may be necessary under direction of a physician, who, in desperate cases, is needed for discovering the bleeding-point, and by whom plugging of the nostril may be resorted to.

**Nosology**, in medicine, that science which treats of the systematic arrangement or classification and nomenclature of diseases. Many systems of nosology have been in use at different times, some of which have been founded on the nature of the ascertained cause of disease; others on the pathological conditions which attend diseases; and still others on the differences between structural and functional diseases, and so on. The system introduced by William Farr, the London medical statistician, has in recent years been accepted as the most advantageous for statistical purposes. It is expanded most fully in the nomenclature of diseases issued in 1884 by the Royal College of Physicians and Surgeons. Ten years later this work was revised, and it is used in the United States as well as in Great Britain.

In Farr's system of nosology diseases are divided into four primary classes, which are subdivided into various orders. The classification is as follows:

*First Class.*—This class includes zymotic diseases, diseases which are either epidemic, endemic, or contagious, induced by some specific body, or by the want of food or by its bad quality. In this class there are four orders: (1) Miasmatic diseases, such as smallpox, measles, scarlatina, diphtheria, croup, whooping-cough, scarlet, typhus, typhoid, and yellow fevers, cholera, ague, boils, erysipelas, dysentery, rheumatism, diarrhoea, etc.; (2) enthetic diseases, such as syphilis, gonorrhoea, hydrophobia, leprosy, glanders, etc.; (3) dietetic diseases, such as famine, fever, scurvy, rickets, cretinism, delirium tremens, etc.; (4) parasitic diseases, as itch or scabies, worms, scald-head, etc.

*Second Class.*—In this class are included constitutional diseases, those affecting several organs, in which new morbid products are frequently deposited; sometimes hereditary. This class is divided into two orders: (1) Diathetic

## NOSSAIRIANS — NOTABLES

diseases, such as gout, dropsy, cancer, canker, mortification, dry gangrene, etc; (2) tubercular diseases, as scrofula, phthisis, mesenteric tuberculosis, etc.

**Third Class.**—Local diseases are assigned to this class. These are the diseases in which the functions of particular organs or systems are disturbed or obliterated, with or without inflammation; sometimes hereditary. This class contains eight orders: (1) Diseases of the brain or, more strictly, of the nervous system, as apoplexy, paralysis, mania, epilepsy, hysteria, neuralgia, convulsions, etc; (2) diseases of the heart or circulatory system, as carditis, valvular disease of the heart, aneurism of the heart and aorta, fainting, varicose veins, etc.; (3) diseases of the lungs or respiratory system, as bronchitis, laryngitis, pleurisy, asthma, pneumonia, tuberculosis, phthisis, etc.; (4) diseases of the bowels or digestive system, as gastritis, enteritis, jaundice, constipation, dyspepsia, pancreatic disease, etc.; (5) kidney diseases, as stone, gravel, diabetes, Bright's disease, etc.; (6) genetic diseases, as varicocele, uterine tumors, ovarian tumors and dropsy, etc.; (7) bone and muscle diseases, as caries, spinal curvature, necrosis, exostosis, soft and brittle bones, muscular atrophy, etc.; (8) skin diseases, as roseola, eczema, whitlow, impetigo, acne, etc.

**Fourth Class.**—Under this class are embraced developmental diseases, special diseases resulting from the formative, reproductive, and nutritive processes. This class includes four orders: (1) Developmental diseases of children, as malformations, idiocy, congenital deaf-dumbness, teething, etc.; (2) developmental diseases of women, as chlorosis, childbirth, paramenia, climacteria, etc.; (3) developmental diseases of old people, as old age and its concomitant affections; (4) diseases of nutrition, as atrophy, debility, etc.

Various other classifications have shown some advantages for special purposes; in fact different systems will always be required for different uses. Recent progress in bacteriology has necessitated modifications in nosological methods, and future advancements will do the same, while the methods of modern medicine lead to such classifications as best suit the requirements of scientific knowledge applied in ordinary practice.

**Nossairians**, nös-sä'rī-anz (Arabic for Nazareans), a subdivision of the Shiites, or followers of Ali, who hold that God has incorporated himself with some of their prophets, particularly with Ali, and Mohammed ben-Hanisiah, his son. The Nossairians are charged with borrowing this doctrine from the Christians who teach the incarnation of God in Christ, hence they nickname them Nazareans. Consult Broughton, 'History of Religions.' See MOHAMMEDANISM.

**Nossi-Bé**, nös-sé-bä', a volcanic island off the northwest coast of Madagascar; about 14 miles long and eight miles wide. In 1840 it was ceded to France by Madagascar, and when Madagascar became a possession of France, in 1896, Nossi-Bé became a part of the territory under the governor-general of Madagascar. Portions of the island are very fertile. Hellville, the chief city, is a port of call visited annually by a large number of ships. Pop. about 9,500. See MADAGASCAR.

**Nostal'gia** (Greek, "homesickness"), a feeling of depression and anxiety due to absence from home or country. The victim of this disease is possessed with the desire to return, and often filled with apprehension and despair when the desire is without early prospect of being gratified. The condition is apt to be attended by loss of sleep, loss of appetite, often by emaciation, and various forms of physical malady, while the psychic disturbance sometimes leads to melancholia ending in mania and death. Nostalgia is especially liable to occur in cases of unwilling absence from home, as those of conscripts, etc. Even soldiers voluntarily serving far from home are often great sufferers from this disease, inasmuch that army medical officers have come to recognize it in its extreme severity as a disability warranting furlough, or even discharge, in order to save the patient's life. This aspect of nostalgia has recently been impressively illustrated in the United States army in the Philippines.

**Nostradamus**, nös-tra-dä'müs (true name MICHEL DE NOTREDAME), French physician and astrologer: b. Saint Remy, Provence, 14 Dec. 1503; d. Salon 2 July 1566. He was of Jewish descent, studied first at Avignon, and then at the medical school of Montpellier, and after taking his degree acted for some time as a professor, but afterward settled as a medical practitioner at Agen. Finally, after traveling in Italy, he established himself at Salon, near Aix, about 1544, where he wrote his famous 'Prophéties' (Centuries) or astrological predictions written in rhymed quatrains. They obtained great success; Catherine de' Medici invited him to court to cast the horoscope of her sons; and on the accession of Charles IX. he was appointed royal physician. In 1550 he published an almanac containing weather predictions. Consult: Barreste, 'Nostradamus' (1842).

**Nostrils.** See NOSE AND THROAT; NOSEBLEED.

**Nos'trum**, a derogatory term for quack remedies and medicines, and for certain patented remedies which have proven worthless or injurious.

**Nota**, nō'tā, Alberto, Italian dramatic poet: b. Turin 15 Nov. 1755; d. there 18 April 1847. He was carefully educated and after studying law practised for a long time as an advocate, and held important appointments under government until the political circumstances of Italy obliged him to retire from public life. The comic element is weak in him, the plot usually very simple, and the events taken from ordinary life. On the other hand he excels particularly in his delineations of character, and most irregular natures are presented with extraordinary skill. Of his numerous dramas 'La Fiera' (1826), a graphic and amusing description of manners, is perhaps the best. Among others may be named 'Il Filosofo celibe' (1811); 'La novella sposa' (1826); 'Il Torquato Tasso' (1826). Twelve editions of his works appeared between 1816 and 1843, the last Italian edition 'Comedie di Alberto Nota' (8 vols.) appearing 1842-3.

**No'tables**, Assembly of, in French history, signifies the deputies of the states who were appointed and convoked by the king. In the early history of France mention is several times made of the notables; but the first assembly of any














## NOTARY — NOTATION

importance was in 1558. From 1626 no such assembly was again called, till in 1786 the minister and comptroller-general Calonne conceived the idea of summoning the notables for the purpose of effecting several arrangements which he considered necessary; and there were accordingly assembled 7 princes of the blood, 9 dukes and peers, 8 field-marschals, 22 noblemen, 8 counselors of state, 4 masters of requests, 11 archbishops, 37 chief justices, 12 deputies, the civil lieutenant, and 25 magistrates of the different cities of the kingdom, making in all 144 persons. This assembly forms an epoch in the modern history of France. A second meeting of the notables was called in November 1788 to consult on the manner of assembling the States-General. See FRANCE, *History*.

**No'tary, or Notary Public** (Latin, *notarius*, from *nota*, mark), originally denoted, with the Romans, those slaves or freedmen who acted as stenographers (making use of certain abbreviations, signs, *notæ*), particularly in the meetings of the senate. In later times the *notarii* were the secretaries of public authorities. From the Romans the name passed over to the nations of Western Europe; and in modern times a notary is a witness, appointed as such by government, whose testimony is in some cases useful, to give credibility to instruments; in other cases is required by law to give them full validity, as, for instance, in protests of bills of exchange, etc. In France the importance of the notary was, and still is, greater than anywhere else. He is not only a public witness for every one who wishes his testimony, but he is also the great witness of government. He makes all contracts, mortgages, and other deeds and conveyances where the property in question amounts to more than 150 francs.

In Great Britain and the United States a notary public is a person who publicly attests deeds, or writings, to make them authentic in another country; but he principally acts in business relating to commerce; makes protests of bills of exchange which are not accepted or not paid; attests the statements of masters of ships in regard to the damage which their vessels have suffered, etc. Notaries are usually commissioned by the executive of their States, and derive their particular powers from statute provisions. In Rhode Island they are elected annually by the general assembly. In New York the statute which defines their powers in respect to foreign and inland bills, drafts, and notes, confers upon them the further authority "to exercise such other powers and duties as by the law of nations and according to commercial usage, or by the law of any other state, government, or country, may be performed by public notaries." In New Hampshire, in addition to the usual powers of the office, notaries may take depositions, and acknowledgments of deeds before them have the same validity as those made before justices of the peace. Similar provisions are found in the statutes of Connecticut and Rhode Island. In New York State women are occasionally appointed notaries by the Governor.

**Notation, Arithmetical**, any mode of designating number by marks or figures. Modes of arithmetical notation are more ancient than modes of representing ideas and concepts by ideographs, hieroglyphs, or alphabetic charac-

ters. Doubtless the first step toward a system of numerical notation was that of designating unity by a single stroke or score, and additional units by additional scores or strokes. The Roman system of notation plainly had its origin in this primitive method, in which all numerical quantities were noted by strokes, one for each unit. But, so to speak, the instinctive mode of counting by means of the 10 fingers (*digiti*) would suggest the division of a long line of strokes into groups of 10, answering to the 10 fingers; and it is supposed that each group of 10 would be marked off by two intersecting diagonal lines forming a cross or X, thus, . The group once thus marked off, the X would become its representative abbreviation and would express 10. Similarly, half of 10, 5, would be represented by the upper half of X, which is V. And as it came to be a principle of Roman notation that a smaller number prefixed to a greater was to be subtracted from it, 4 would be represented by IV and 9 by IX: in some instances 8 and 18 would be represented by IIX and IIXX, respectively. Ten X groups were represented in Roman notation by , or (rounded) C, the initial letter of Lat. *centum*, hundred; and as V (five) was formed of X, being half of X, so by cutting off the upper limb of  a symbol was found for 50 (L), half of *centum*. The subtractive mode of expression was usual in the notation of 40 (XL), of 90 (XC), or 400 (CD), etc.; less usual was *XXC* for 80. Ten hundred was represented by M, the initial letter of *mille*, thousand, and this M was commonly written ; half of this symbol was used to designate half a thousand and was written either D or ; the sign for thousand, too, was currently written . These are all the signs used in Roman numeration—seven in all. Higher numbers, up to a million, were expressed as follows: 10,000, ; 100,000, ; 1,000,000, . The symbol for 10,000, , being cut in two, the latter half, , represented 5,000; in like manner  represented 50,000, and  500,000. With this cumbersome method of notation all arithmetical operations involved great difficulty, and hence for any but the most trifling calculations the ancient Romans had to resort to the use of the abacus (q.v.).

That, like the Romans, the primitive Greeks employed a method of notation by strokes appears from rude inscriptions on archaic monuments and on vases; but, unlike the Romans, the Greeks at an early period abandoned that clumsy mode and resorted to the alphabet for number-symbols, adopting the method of notation which was in use among the Phœnicians and the Hebrews. Neither the Phœnician nor the Hebrew alphabet had the requisite number of letters (27), and the lack (five) was supplied by five arbitrary signs. The Greek alphabet had 24 letters, and to these were added three other characters, namely,  $\varsigma$  for six,  $\rho$  or  $\eta$  for 90 and  $\theta$  for 900. The Greek notation parallels the Hebrew, letter for letter from alpha ( $\alpha$ ), one, to omicron ( $\omicron$ ), 70; Hebrew Phœnician and Greek agree in employing the first nine letters or symbols to designate units; the second nine to designate tens, and the third to designate hundreds. The Greek scheme is as follows:

# NOTCH — NOTHOSAURUS

1	2	3	4	5	6	7	8	9
α	β	γ	δ	ε	ς	ζ	η	θ, ϑ
10	20	30	40	50	60	70	80	90
ι	κ	λ	μ	ν	ξ	ο	π	ρ, ϱ
100	200	300	400	500	600	700	800	900
ρ	σ	τ	υ	φ	χ	ψ	ω	?

To express thousands, the letter iota (ι) or an accent mark (') is subscribed to the numeral letters, for example, α' = 1,000, β' = 2,000, etc.; to express a number multiplied by 10,000 the capital letter M is subscribed (M standing for *μυρία*, 10,000), for example, δ<sub>M</sub> = 40,000, α<sub>M</sub> = 8,000,000. Fractions are written with the numerator on the line and the denominator a little above, and a small space left between the integer and the fraction, thus: κα 87 = 21 7/8.

Though the Greek notation is far superior to the Roman, it makes arithmetical operations exceedingly complex. For example, in multiplying 123 (ρκγ) by 321 (τκβ) these operations are necessary:

ρ	multiplied by	τ	=	30,000	=	γ <sub>M</sub>	
κ	"	"	τ	=	6,000	=	ς
γ	"	"	τ	=	900	=	ζ
ρ	"	"	κ	=	2,000	=	β
κ	"	"	κ	=	400	=	υ
γ	"	"	κ	=	60	=	ξ
ρ	"	"	α	=	100	=	ρ
κ	"	"	α	=	20	=	κ
γ	"	"	α	=	3	=	γ
				39,483	γ <sub>M</sub>	ρ ρ γ	

The Chinese system of notation was originally in principle the same as the Roman, but has been much simplified and variously improved, so that it is almost as expeditious a means of representing very large numbers as our own notation. But it is still almost or quite as cumbersome as the Roman system in the representation of numbers under 20. In it 1, 2, 3, 4 are represented by strokes, 5 by a special symbol and 6, 7, 8, 9 by that symbol followed by the requisite number of strokes: there is a symbol for 10, and from 10 to 20 the numbers are written after the same manner as those from 1 to 10. But while in the Roman system the series of tens is represented by XX, XXX, XXXX (or XL), etc., in the Chinese the successive decades are expressed by the symbol for 10 with the symbols for 2, 3, 4, etc., to the left of it as multipliers; and in like manner multipliers of hundreds, thousands, etc., are affixed.

The decimal system of notation by the nine "Arabic" numerals and the cipher appears to have been introduced into Europe through the Arabians in the 11th century; but the system had been employed centuries before in India. Though evidence exists of its use in Spain and in Italy in the 13th century by learned men, it was fully 300 years before it displaced the clumsy Roman system even in England. Though the digit-signs themselves, by their simplicity, are infinitely superior to the Roman symbols, and by their small number, ten, are far more efficient than the 27 Greek letter-numbers, the preeminent advantage of the decimal system over all other systems consists in the fact that in a line of figures, however long, the value of each, whether in units, tens, hundreds, thousands or millions, is determined by its place in the line. A figure standing alone represents never more than nine; a figure in the first place to the left of the last figure in a line represents

always its own digit value multiplied by 10; in the third place, the same multiplied by 100, and so on; each remove to the left raises the value of the figure tenfold. The use of the cipher is to keep the figures in their due places in the line; thus in 190 the cipher keeps the nine in the place of the tens; in 2,043, the cipher keeps the 2 in the place of the thousands. Before the decimal system of notation had displaced the Roman system, writers often combined the two, putting, for example, X3 for 13, or L9 for 59; or, being ignorant of the function of the cipher and of the significance of the mere position of a figure in a line they would write 502 for 52, as they would write in Roman numerals LII, or in Greek letter-numbers ρβ. In view of the adaptability of the Arabic notation and numeration to the expression of numbers, whether integral or fractional, it is singular that the common use of decimal fractions was first proposed as late as 1585, by Simon Stevin or Stevinus, native of France, but employed in the military service of Maurice, Prince of Orange. But had it been necessary to retain his awkward method of decimal notation, the decimal system could hardly have come into general use. He expresses thus the decimals in 237.578: 237 5 7 8 3. Even Napier, to whom the credit is usually given of having first employed the decimal point, expresses the decimals of 1993.273 thus: 1993.2737, though in another place he uses this form: 1993.273. Later, Napier substituted the point (.) for the comma as sign of a decimal fraction.

Duodecimal and Sexagesimal Notations are scales of notation in which 12 and 60 respectively are the base. In duodecimal notation the local value of the symbols increases twelve-fold as they proceed from right to left. But in calculations of shillings and pence British, and of feet and inches, though part of the work is done on the duodenary scale, the numbers themselves are expressed both in symbols and in words according to the denary scale and the decimal nomenclature. Twenty-four feet nine inches on a duodecimal scale would be 20.9, that is, two twelves without integer remainder, and nine twelfths; but we write it 24.9. The sexagesimal scale is used in the common subdivision of the hour into minutes and seconds; but as in the case of the foot and the inch, the shilling and the penny, we express the result of calculations according to the common denary scale: a complete workable sexagenary scale would require the invention of sixty different symbols.

**Notch, The.** See CRAWFORD NOTCH.

**Note,** (1) in law and business. (See PROMISSORY NOTE.) (2) In music, a character which, by its place on the staff, represents a sound, and by its form determines the relative time or continuance of such sound. See MUSIC.

**Nothosaurus,** a genus of small sauropterygian reptiles, allied to the plesiosaurs, and the type of a family which includes several genera confined to the Triassic period, and prevalent as fossils in the Old World, especially in the German Muschelkalk formation. Their necks were long and terminated in an elongated skull with crocodile-like jaws; the limbs were comparatively long and slender. Consult: Tittell-Eastman, 'Text-book of Palæontology,' Vol. II. (1902).



**Notker**, nôt'kër, two Swiss monks of the monastery of Saint Gall. **SAINT NOTKER BALBULUS** (the Stammerer): b. Thurgau about 840; d. St. Gall 6 April 912; is best known for his adoption of the simple Roman or Gregorian chants, and for his words for many sequences, the most famous being 'Media vita in morte sumus.' He was canonized 1513. **NOTKER LABEO** (Thick Lipped; sometimes called "Teutonicus," the German); b. about 950; d. 1022; founded a great school of translators, who, working under his name translated into German Boethius, the Psalter, etc., and thus left important documents for the study of Old High German in the 10th and the 11th centuries. The versions of Labeo and his school are edited by Piper (1883-4). Consult Kelle, 'Die Sankt Gallen deutschen Schriften und Notker Labeo' (1888).

**Noto**, Sicily, a city and episcopal see, three miles from the Mediterranean, and 27 miles by rail southwest of Syracuse. Its chief buildings are a fine cathedral and town hall. It has manufactures of olive oil, vegetable fibre, wine, and macaroni, and quarries of limestone. Noto dates from 1703 when it replaced the ancient Netaum overthrown in 1693 by an earthquake.

**No'tochord**, or **Chorda Dorsalis**, a rod of gelatinous tissue forming the main skeletal axis in the young of all Chordata (q.v.) and in some persisting as the only support of the body throughout life. It arises in development from the mid-dorsal line of the entoderm (see **EMBRYOLOGY**), becomes cut off from this parent layer and comes to lie as a continuous unsegmented structure between the digestive tract and the central nervous system. Around it is formed an envelope, the notochordal sheath, and in the vertebrates the bodies or centra of the vertebrae arise. In the lower vertebrates parts of the notochord persist throughout life (for example, filling the cavities in the ends of the vertebrae in fishes), but in the higher forms the notochord is almost entirely replaced by bone and the intervertebral ligaments, the sole remnants of this structure in man being the so-called *nucleus pulposus* of these ligaments. See **AMPHIOXUS**; **ASCIDIAN**.

**Notonect'idæ**. See **FRESH-WATER INSECTS**.

**Notor'nis**, a genus of gigantic rail-like birds of the South Island of New Zealand without the power of flight. The genus was first known by fossil remains named *Notornis mantelli*. Subsequently living examples were found; but it is supposed that none now exist. Norfolk Island formerly had another species, pure white, but it was exterminated by early white visitors to the island. Consult Newton, 'Dictionary of Birds' (1896).

**Notothe'rium**, a genus of fossil marsupials found in Upper Pliocene deposits in Greenland and South Australia, allied to *Diprotodon* (q.v.) but smaller.

**Notre Dame**, nô'tr dâm, **University of**, a Roman Catholic institution in charge of the Fathers of the Holy Cross, at Notre Dame, Ind. It was founded in 1842 and chartered two years later. It has 13 full collegiate courses besides courses in art and music. The courses lead to the degrees of A.B., B.S., Ph.B., and B.L. The equipments for all laboratory and applied science

work are exceptionally good; the science building and furnishings are valued at \$500,000. The departments of natural science received great assistance in their foundation work from the personal attention of the scientist, Very Rev. J. A. Zahm (q.v.). The frescoes, and a number of the oil paintings are by Gregori, and are of remarkable beauty and power. To encourage good works along spiritual and intellectual lines, the University presents each year a medal called the "Lætare Medal" to some Roman Catholic layman or woman who has done some special good work for the benefit of humanity. Two regular publications are issued from the University, but one, 'Ave Maria,' is not a distinctively university periodical. Affiliated with the university are several schools for the brothers, novices and young priests of the Congregation of the Holy Cross, and on the grounds is the Provincial House of the Order for the United States. The university has also several preparatory schools in different parts of the United States. In 1910 there were connected with the university 91 professors and instructors; 1,000 students, 450 of whom were in the preparatory department. The library contained 65,000 volumes, valued at \$65,000; the scientific apparatus, machinery, and furniture was valued at \$205,000; and the grounds and buildings at \$2,010,000.

**Notre Dame de Paris**, dé pâ-ré'. See **PARIS**.

**Notre-Dame de Paris**, a romance in prose by Victor Hugo, published in 1831. The scene is placed in Paris at the close of the reign of Louis XI. The cathedral seems to fill the author's vision and dominate his mind from beginning to end. Among his different conceptions of Notre-Dame he brings out most clearly of all the truth that the cathedral of the Middle Ages was the book of the people; and that since the dawn of printing, books have taken the place of those marvelously involved and inexhaustible carvings, where the smoldering passions of the multitude, their humor and irreligion as well as their religion and poetic emotion, found continual expression. To the reader who loses himself in the atmosphere thus created, the world is France, France is Paris, Paris is the cathedral. He is taken through the aisles and galleries, out on the roof, up in the towers, then faithfully, scrupulously through the squares or cross-roads of the old city, along crooked streets that have vanished, and thoroughfares still existing, like Rue Saint-Jacques or Rue Saint-Denis, which it calls the arteries of Paris. Thus it may be taken as a 15th century guide-book of the town, answering all the purposes of a Baedeker; not only giving the general topography, but touching on nearly every structure then standing. Like Walter Scott's 'Quentin Durward,' and Théodore de Banville's play 'Gringoire,' 'Notre-Dame' contains a searching study of the treacherous but able monarch, Louis XI.

**Nott**, nôt, **Charles Cooper**, American jurist: b. Schenectady, N. Y., 16 Sept. 1827. He is a grandson of Dr. Eliphalet Nott (q.v.) and of Dr. Charles D. Cooper. He was graduated from Union College in 1848, studied law at Albany, N. Y., and began the practice of his profession in New York in 1851. Through his means, in February 1860, Abraham Lincoln came to New York to deliver the "Cooper Institute Address," which resulted in Lincoln's nomination for the Presi-

## NOTT — NOURMAHAL

gency. During the Civil War he served as captain in the 5th Iowa cavalry, and colonel of the 176th New York volunteers. Taken captive at Brashear, La., in June 1863, he was held prisoner in Texas until July 1864. In February 1865 he was appointed judge of the court of claims, and in November 1896 was appointed chief justice of the court by President Cleveland. He has published: 'Mechanics' Lien Laws' (1856); 'Sketches of the War' (1863; in German 1883); 'Sketches of Prison Camps' (1865; in German 1884); and has edited and compiled 'The Seven Great Hymns of the Mediaeval Church' (1866, 8th ed. 1902), and the 'Court of Claims Reports' (38 vols. 1867-1903).

**Nott, Eliphalet**, American clergyman and educator: b. Ashford, Conn., 25 June 1773; d. Schenectady, N. Y., 29 Jan. 1866. He was graduated from Brown University in 1795 and entered the Presbyterian ministry the same year. After holding pastorates in Cherry Valley and Albany, N. Y., he became president of Union College in 1804, where he remained till his death. He published: 'Counsels to Young Men' (1810); 'Lectures on Temperance' (1847). His funeral sermon on the death of Alexander Hamilton was widely famous. By his inventions of stoves and other warming apparatus he acquired a fortune, much of which he devoted to the assistance of Union College.

**Nott, Josiah Clarke**, American ethnologist and physician: b. Columbia, S. C., 24 March 1804; d. Mobile, Ala., 31 March 1873. In 1824 he was graduated at the South Carolina College and from the medical school of the University of Pennsylvania in 1827. After further study abroad he established himself in Mobile, and in 1858 founded a medical school there. During the Civil War he was for a time on the staff of the Confederate General Bragg. With G. R. Glidden (q.v.) he wrote 'Types of Mankind' (1850), and 'Indigenous Races of the Earth' (1857), the purpose of which was to oppose the theory of the unity of mankind. He was sole author of 'The Connection Between the Biblical and Physical History of Man' (1849); 'The Physical History of the Jewish Race' (1850).

**Nottebohm, nôt'të-bôm, Gustav**, German composer: b. Lüdenscheid, Westphalia, Prussia, 12 Nov. 1817; d. Grätz, Germany, 1 Nov. 1882. He served in the German army at Berlin in 1838-9, but continued his musical studies, and there formed a friendship with Schumann and Mendelssohn, through the influence of the latter obtaining his discharge from the army and becoming a composer of note. Among his works are: 'Ein Skizzenbuch von Beethoven' (1865); 'Mozartiana' (1880); etc.

**Nottingham, nôt'ing-am, Heneage Finch**, 1ST EARL OF, English statesman: b. Kent, England, 23 Dec. 1621; d. London 18 Dec. 1682. He was educated at Oxford, studied law and was admitted to the bar of the Inner Temple in 1645. At the Restoration his reputation as a lawyer raised him to the post of solicitor-general; in 1661 he was elected member to Parliament for the University of Oxford, and was made a baronet, in 1670 became attorney-general, and in 1673 lord-keeper. He was made high chancellor in December 1674. In the same year he was made Baron Finch, and in 1681 became

earl of Nottingham. His powers as an orator were highly rated; and Dryden has given to posterity his portrait in 'Absalom and Achitophel,' under the character of Amri. Several of his speeches on the trials of the judges of Charles I. have been published, as have also some of his parliamentary orations.

**Nottingham, England**, a city and civic county, capital of Nottinghamshire; on the Leen, near its junction with the Trent, 110 miles northwest of London. It occupies a picturesque site overlooking the Vale of Trent. The castle, which crowns the summit of a rock, rising 133 feet above the level of the Leen, was originally built by William the Conqueror as a means of overawing the outlaws frequenting the recesses of Sherwood Forest. Dismantled during the Protectorate, it subsequently became the property of the Duke of Newcastle, who in 1674 erected a large mansion on part of the site. This, after being partly burned in riots connected with the reform movement in 1831, now contains the Midland Counties Art Museum, free library, etc. The principal educational and literary institutions are the University College and Technical School, high school for boys, the Blue-Coat School, the School of Art, the People's Hall, and the Mechanics' Institute. An arboretum covering 18 acres is a feature of the town. The staple manufactures are cycles, hosiery, and lace, the latter being a specialty. There are also manufactures of cotton, woolen and silk goods, and of articles in malleable and cast iron. Nottingham was a place of importance in Anglo-Saxon times, and was twice or thrice taken by the Danes. Charles I. raised his standard here in 1642, and next year the town and castle were taken by the Parliamentarians. Serious riots, occasioned by the introduction of machinery, took place in 1811-12 and 1816-17. Pop. about 250,000.

**Nottoway (nôt'ô-wâ) Indiana**, an American tribe of the Algonquin family, formerly residing along the Nottoway River, in Virginia. They were very similar to the Tuscaroras of North Carolina. In 1785 about 400 survivors of the tribe occupied a reservation of 27,000 acres.

**No'tus**, the south wind or southwest wind.

**Noûe, François de la, frân-swâ dé lâ noo**, French Huguenot captain: b. near Nantes 1531; d. Montcontour 4 Aug. 1591. He was a member of an o'd Breton family, fought in Piedmont under Brissac, became a Protestant in 1557, and was one of Coligny's bravest lieutenants. In 1570, at the siege of Fontenay-le-Comte, he was wounded in the left arm, and after its amputation wore an iron mechanism to hold the bridle, thus winning the nickname of "Bras de Fer," or "Iron Arm." He fought in Flanders with great success from 1578 to 1580, when he was captured by the Spanish. His five years of captivity were occupied with the composition of his 26 'Discours politiques et militaires' (1587). He fought under Henry of Navarre at Senlis, Arques, Ivry, and Lamballe, and was mortally wounded in the last fight. Consult the biography by Hauser (1892).

**Nourmahal, noor-ma-hâl'**, 'LIGHT OF THE HAREM,' the heroine of Thomas Moore's poem, 'The Light of the Harem, in 'Lalla Rookh.' Her quarrel and reconciliation with the caliph

## NOUVELLE FRANCE—NOVA SCOTIA

Harun al-Rashid form the theme of the story; afterward she is known as Nourjehan—"Light of the World."

**Nouvelle France**, *nōo-vēl frāns*, or **New France**, the original name given to Canada (q.v.) by the early French settlers.

**Nova Cæs'area**, the Latin name for New Jersey.

**Nova Constella'tio Coinage**, two silver coins proposed by Robert Morris in 1783 for national coinage, but not accepted by the Continental Congress. They were called the Mark and the Quint. See NUMISMATICS.

**Nova Scotia**, *nō'vā skō'shī-ā*, one of the three maritime provinces of the Dominion of Canada, comprises a long, narrow peninsula, on the eastern coast of North America, lying northeast and southwest, and the island of Cape Breton, separated from the peninsula on the northeast by the gut of Canso, 16 miles long and from  $\frac{1}{2}$  mile to 2 miles wide, and Chedabucto Bay. The dangerous Sable Island, surrounded by a sand bank on which many ships have been wrecked, is a dependency of Nova Scotia, from which it is distant about 90 miles in lat.  $43^{\circ} 59'$  N. at its eastern end, lon.  $59^{\circ} 45'$  W. The whole province, including Cape Breton, lies between lat.  $43^{\circ} 25'$  and  $47^{\circ}$  N. and lon.  $59^{\circ} 40'$  and  $66^{\circ} 10'$  W. The greatest length of the peninsula is about 280 miles and its greatest width from 50 to 100 miles. It is bounded north by the Straits of Northumberland and the Gulf of Saint Lawrence, south and southeast by the Atlantic Ocean, and northwest by the Bay of Fundy. The island of Cape Breton, whose extreme length is 100 miles, extreme width 85 miles, is almost equally divided by an inland sea, the Bras D'Or Lake. The peninsula has an area of 12,360 square miles, and Cape Breton 3,120 square miles. Sable Island is 25 miles long and  $1\frac{1}{4}$  wide, and consists of sand hills thrown up by the sea, on which grasses grow which maintain many wild horses known as Sable Island ponies.

**Topography.**—The surface of Nova Scotia proper is undulating, and the scenery varied but not grand. Three ranges of highlands, with a general direction of from southwest to northeast, their general features clearly showing them to belong to the Appalachian Range, diversify the surface. These, roughly, are the range extending along the Atlantic coast from Cape Sable to Cape Canso, which are chiefly of Lower Cambrian formation, except for a belt of intrusive granite that stretches from Cape Sable to Chebucto Head, near Halifax; the Cobequid Mountains, which rise to a height of about 1,050 feet and extend from the Bay of Fundy on the north or isthmic side of the province, through the counties of Colchester and Cumberland to the vicinity of Pictou; and a detached, narrow ridge of trap, known as the North Mountain, about 700 feet high, which extends along the Bay of Fundy, from Digby County to the steep headland of Blomidon, in Kings County, near the entrance of Cobequid Bay. The rock formation of Cape Breton is similar to that of Nova Scotia proper, but is more irregularly distributed. The chief features of the surface of Nova Scotia were left marked as at present by the great earth storm of the later

Devonian period. The fertile valleys between the three ranges of hills are respectively of Upper Silurian, Devonian, and Carboniferous origin. The northwest side of the peninsula is deeply indented by large arms of the sea, separated by steep promontories. The Atlantic side is penetrated everywhere by inlets of greater or less size, the most important of which are Chedabucto Bay, Halifax Harbor, and Chester Basin. The north shore, on the Gulf of Saint Lawrence, is comparatively smooth and uniform in its coast line, and this is true also of the eastern coast of Cape Breton, while the other sides of this island are very irregular. The peninsula has about 400 lakes, of which Rossignol in Queen's County is the largest. The Bras D'Or Lake in Cape Breton covers an area of 500 square miles, or about one sixth of the entire area of the island. The climate of Nova Scotia, tempered as it is by the Gulf Stream, which flows very near its southwesterly end, is comparatively mild, and especially in the sheltered Cornwallis and Annapolis valleys is favorable to comfort and health. The average temperature is  $65^{\circ}$  F. in summer,  $25^{\circ}$  F. in winter. The average rainfall for 27 years (1874-1900) was 38.1, average snowfall for the same period 75.4, total precipitation 45.6. On account of its freedom from extreme heat Nova Scotia has lately become a popular summer resort for United States people of the eastern and middle States. The province contains many rivers, but few of them are over 50 miles in length. In the valleys the soil is of great richness, and Nova Scotia is noted for its vast tracts of inexhaustibly fertile dyked marsh land, in earlier or later times by patient industry reclaimed from the sea. This marsh land lines the head waters of the Bay of Fundy and spreads far inland up the valleys of its river tributaries. In general, alluvial deposits are formed in river basins by materials washed down from higher levels by fresh-water floods; here the whole deposit is of tidal origin, the result of a landward rather than a seaward transportation. Every incoming tide is freighted with a finely comminuted sediment, the product of the wearing action of the currents upon the sides and bottom of the bay. The elements of this sediment are trap and new red sandstone, the latter being the greater element. Its detritus consists of a large percentage of silica, a little clay, the iron which mainly determines the reddish color of the deposit, and the calcareous matter which served as cement in the parent rock. The great fertility of this alluvium may be seen in the fact that the Annapolis, Cornwallis, Grand Pré, and Cumberland marshes have been producing annually for over two centuries from two to four tons per acre of the finest hay. After the hay has been removed the dikes are converted into autumn pastures for cattle, who fatten more rapidly on their luxuriant after-growth than on any other kind of food. The reclaiming of these dikes from the daily tides, which if permitted to rush in will destroy the grass for a year, was begun by the Acadian French and energetically pursued by their successors, the New England people who came in 1760-1. The flora of Nova Scotia is much the same as in other sections of Canada south of the Saint Lawrence. The woods are maple, elm, walnut, oak, tamar-

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rack, spruce, pine, and other woods, hard and soft.

**Agriculture.**—The most important industries of the province are agriculture and fruit growing, fishing, mining, and lumbering. Of late, however, a good deal of activity has been shown in manufacturing of various kinds. Nova Scotia has an area above tide level of 13,483,671 acres, of which 5,080,901 are occupied. Of this, 34,240 acres are covered by orchards of apples, pears, plums, and cherries; 554,371 acres are hay land, 16,334 are in wheat, 37,459 in potatoes, and 91,087 in oats. In the last 20 years the fruit industry has greatly increased, cold storage making possible large shipments, especially of apples, to the British market. The total yield of apples in 1891 was 1,051,592 bushels; of plums, 9,246 bushels; of peaches, 534 bushels. In 1901 the yield was, apples 2,065,104 bushels; plums, 28,931 bushels; peaches, 3,231 bushels. The total value for 1902-3 of agricultural products, including fruit was \$853,106, of apples alone \$188,910, of animals and dairy products \$711,207, of woods exported \$1,048,160.

**Fisheries.**—The fisheries have always been active, salmon, cod, shad, mackerel, lobsters, and other fish abounding off the shores and in the rivers. The value of the total catch in 1901 was \$2,112,022, an increase of \$390,288, or nearly 23 per cent, over the value of 1899. The number of men employed in fishing vessels and boats in 1900 was 25,212, of persons employed in lobster canning factories, 6,447. The value of all fisheries for the fiscal year ending June 1903 was \$8,000,000, and the number of men employed 29,529. Fishing receives from the Dominion government a subsidy outside of bounties of about \$400,000 a year. In many parts of the province game is plentiful, bears, foxes, deer, and smaller animals being found in considerable numbers.

**Minerals.**—Nova Scotia is remarkably rich in minerals, the coal fields being almost inexhaustible, and gold, lead, copper, manganese, gypsum, and barytes being found in abundance. For the year ending 30 Sept. 1901 the sales of coal aggregated \$3,119,335, the Province of Quebec being the largest consumer. The province has 11 coal mines, 5 of which are in the peninsula and 6 in Cape Breton island. In 1902-3 these mines employed 8,062 persons. There are more than 20 districts where gold is mined, the most important mine being at Sherbrooke in Halifax County. Between 1900 and 1901 the number of tons of ore crushed was 1,358,864, and the value of the gold extracted about \$14,274,054. The value of the gypsum yield in the same year was \$119,278. The mine royalties in 1902-3 reached the large figure of \$487,948.90.

**Manufactures.**—In 1902-3 the value of manufactured products exported from Halifax reached the sum of \$766,164. Among the chief manufactures are agricultural implements, biscuits and breads, coke, drugs, and chemicals, extract of hemlock bark, fertilizers, furniture, iron and steel, leather, and wood pulp. The canning of fruits, milk, and meat is receiving much attention. In Cape Breton and the western part of the peninsula considerable leases of crown lands have lately been made for the development of the wood pulp industry. In various places, owing to the abundance of hemlock bark, tanning is actively carried on, and

some attention has long been given to sugar refining and rope and twine making.

**Finances.**—The revenues of the province come chiefly from a Dominion subsidy of about \$433,000 annually; from mine royalties, which exceed this sum; from the lease of crown lands, which in 1901-2 amounted to \$74,735; and from succession duties and other miscellaneous sources. The total revenue from all these sources in 1902-3 was \$1,140,216. The expenditures were less than the revenue by about \$53,000. At the close of the fiscal year ending 30 Sept. 1902 the debt of the province was \$3,766,300. Nova Scotia supports a school for the deaf and dumb and one for the blind, an insane and a general hospital, and 24 poor-houses. Criminals are sent to the provincial penitentiary at Dorchester, N. B. The public charities in 1902-3 cost the province \$40,573.

**Transportation.**—In 1901 the province had in operation 943 miles of railway; since then this has been increased to 1,055. There are now under construction 182 miles more. Telegraph and telephone lines run everywhere and the province has two cable stations, one at Canso and one at Sydney. At the close of 1901 Nova Scotia had in registration 1,980 vessels with a tonnage of 214,560. In that year she had registered 133 vessels with a tonnage of 14,660. The total number of ships arriving from foreign ports during the fiscal year ending 30 June 1901 was 3,103; tonnage 419,031. This registration includes the ships arriving at 85 ports. Of these Halifax heads the list, with 1,185 vessels and 899,079 tons, Sydney coming next with 361 vessels and 541,455 tons. Halifax is the third port in Canada, Victoria, B. C., being first and Montreal second.

**Banks.**—The banks in operation with their branches are: The Union of Halifax, Royal of Canada, Bank of Nova Scotia, Bank of British North America, and Commercial of Windsor. The clearing house transactions in 1900 amounted to \$77,000,000.

**Population.**—The population is greater than that of any province of the Dominion except Ontario and Quebec. Ontario has over 2,000,000 inhabitants, Quebec over 1,500,000, and Nova Scotia, 459,574. Of this number 162,141 are reckoned as of English descent, 142,207 as Scotch, 55,830 as Irish, 45,067 as French, and 38,854 as German. The increase in population between 1891 and 1901 was 8,800. Halifax, the capital, has a population of 40,787; in 1891 it was 38,495. The next town in size is Sydney, the seat of the recently established steel industry in Cape Breton. In 1901 this town had a population of 9,908. In 1891 it had only 2,427. The number of incorporated towns in all is 28; of these the largest are Glace Bay, Yarmouth, Truro, Springhill, Amherst, New Glasgow, Windsor, and Pictou.

**Government.**—Since confederation the province has been represented at Ottawa by 10 senators, and 20 members of the lower house. It has its own local legislature, meeting at Halifax, and a lieutenant-governor appointed by the governor-general and his council. The local legislature consists of a council of 21 members and a legislative assembly of 38. The executive consists of three ministers with salaries and six without portfolios. The house of assembly is elected by the counties, the municipal units of government being counties and

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**towns.** In each of the 18 counties the people elect a county council, which in turn appoints the other county officers. It is necessary to secure the sanction of the people in order to borrow money, and the lieutenant-governor has a right of veto upon the money-borrowing powers as well as the by-laws passed by the council.

**Education.**—Nova Scotia has an admirable free school system, which was introduced in 1865, but there are no separate schools as in Ontario and Quebec, under denominational control, receiving government support. In each of the 18 counties of the province there is a county academy, the highest grade of the public schools, the curriculum of which contemplates the fitting of pupils for college. In Truro there is a normal school, in which 1,044 teachers serving in 1901-2 were trained for their work. The whole number of teachers in that year was 2,492, and the number of pupils enrolled was 99,059. The schools are supported by local taxation and by subsidy, about two fifths of the necessary cost being met by government grant and municipal aid. The total expenditure per pupil in 1900-1 was \$15.75. Education is controlled by a Council of Public Instruction, of which the Superintendent of Education is the head. The council is composed of the members of the Executive Council. The province has besides the schools already mentioned a school of agriculture, a school of mechanical and domestic science, several manual training schools, a school of art and design, a summer school of science, and five chartered colleges, and one divinity college having the power to confer degrees. The colleges are Kings at Windsor, Dalhousie at Halifax, Acadia at Wolfville, Saint Francis Xavier at Antigonish, and St. Anne's at College Point in Digby County. The divinity college is controlled by the Presbyterians and is at Halifax. The only college that is undenominational is Dalhousie at Halifax. In all these colleges together there are not more than 700 students. In Halifax, Windsor, Wolfville, Horton, and Annapolis there are private schools for boys and girls.

**Religion.**—The chief religious denominations are the Roman Catholic Church with 129,578 adherents, Presbyterian, 106,319, Baptist, 74,978, Anglican, 66,067, Methodist, 57,490, Free Will Baptist, 8,355, Lutheran, 6,572, Congregational, 2,938. No part of the population is without church attachment.

**Distinguished Citizens.**—Nova Scotia has reared many distinguished men, chiefly officers of the army and navy. Such are General William Cochran, Sir John E. W. Inglis, hero of Lucknow, Admiral Sir Provo W. P. Wallis, and Sir Fenwick Williams, hero of Kars. The humorist, Judge T. C. Haliburton ("Sam Slick"), was a Nova Scotian, as are also his son, Lord Arthur Haliburton, and Sir Charles Tupper, Bart., the well known statesman. Among the writers of the province have been Thos. B. Akins, Sir John G. Bourinot, John B. Calkin, Arthur W. Eaton, George M. Grant, Sir J. W. Dawson, George W. Hill, Joseph Howe, Mrs. M. J. Lawson, Arthur Lockhart, Beamish Murdoch, J. Macdonald Oxley, Benjamin Rand, Silas T. Rand, Theodore H. Rand, E. M. Saunders, Marshall Saunders, and T. Watson Smith.

**History.**—The Nova Scotian peninsula was the most important part of the ancient Acadia, and its little town Annapolis Royal, in French times

called Port Royal, while the province remained in the hands of France was the chief Acadian seat of authority and centre of influence. The name Acadia or Acadie is first found in the petition of De Monts to the French king for leave to colonize this portion of the new world. The province of New Brunswick was included in Acadia, but not the island of Cape Breton. Nova Scotia's authentic history begins with the landing at Port Royal in the spring of 1604 of Sieur de Monts, a gentleman of the bedchamber of Henry IV. of France, who had previously accompanied Chauvin and Pontgrave to the Saint Lawrence. There is a French tradition that a little settlement was made in Cape Breton as early as 1541, but Port Royal was the first settlement ever attempted on any part of the peninsula. De Monts held a commission as lieutenant-general of Acadia with full powers to cultivate and hold the land, to discover mines, and to convert the Indians. In his first expedition another nobleman, Baron Poutrincoart, accompanied him. Owing to the failure of the French trading company in 1607, the colony they founded at Port Royal was suspended for nearly three years. In 1610, however, Poutrincoart again came to Port Royal and from that time the town has had a continuous history. When Poutrincoart came the second time he took possession of the houses his people had built in 1604, and it may therefore be said that Port Royal is the oldest town in all North America, except Saint Augustine in Florida, which was founded by Spaniards in 1565. Jamestown, Va., was founded by the English in 1607, and Quebec by Champlain in 1608. Shortly after 1610 other explorers came to Port Royal, in their wake coming first Jesuit, then Recollect priests, who soon converted all the native Micmacs (an Algonquin tribe) to the Roman Catholic faith. In 1613 Argal (afterward deputy governor of Virginia) destroyed the fort at Port Royal. In 1621 Acadia was granted to Sir William Alexander, who named it Nova Scotia and helped James I. establish the order of Baronets of Nova Scotia. In 1628 Sir David Kirk captured Port Royal for England, but in 1633 the province was restored to France. In 1654 Acadia was surrendered to English troops sent out by Cromwell, but in 1667, by the treaty of Breda was restored to France. In 1710 Col. Francis Nicholson finally conquered Port Royal for England, and in 1713 the treaty of Utrecht confirmed Nicholson's conquest. In 1749 Col. Edward Cornwallis brought out an English colony and founded the town of Halifax, immediately afterward establishing a civil government there in place of the military government at Annapolis. In 1755 because of their persistent refusal to take the oath of allegiance, the Acadian French were removed, and in 1760-1 their lands were occupied by 6,000 or 7,000 New England planters, who founded many of the best known families of the province. In 1758 a constitution, with an elective assembly, was granted Nova Scotia, in 1763 Cape Breton and Prince Edward Island were annexed to Nova Scotia, but in 1770 Prince Edward Island was separated. In 1773 began the large Scottish emigration which has given certain counties of Nova Scotia the chief part of their population. In 1776 and 1783 from 30,000 to 35,000 Loyalists, chiefly from New England and New York, poured into the province,

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the New York Loyalists founding the town of Shelburne and creating in Nova Scotia the first colonial see of the English Church. In 1754 New Brunswick and Cape Breton were both separated from Nova Scotia, but in 1820 the latter was re-annexed. In 1848 responsible government was introduced and in 1867 Nova Scotia became a province of the Dominion of Canada. In its history as an English province Nova Scotia has had to the present 32 governors (since Confederation they have been, of course, lieutenant-governors), many of them more or less famous military men. Before the appointment of Lord Dorchester as governor-general of Quebec, Nova Scotia, and New Brunswick in 1786, she had also 11 lieutenant-governors, of whom Gen. Edmund Fanning, a Loyalist, was the last.

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**Nova Zembla**, *nō'va zēm'bla* (Russian, *Novaya Zemlia*), two islands in the Arctic Ocean, belonging to Russia, and forming a dependency of the government of Archangel; lat. 70° 30' to 77° N.; lon. 52° to 69° E. They are separated by the narrow Matotchkin Shar Strait, and from the Isle of Vaigatz on the south and from the mainland on the east by the Sea of Kara. Their greatest length, northeast to southwest, is about 740 miles; breadth, about 80 miles. The greater part of the interior is unexplored. The general slope of both islands appears to be toward Matotchkin Strait, on which the mouths of at least 15 small streams have been counted. Lakes also are numerous. The whole territory is wild and desolate. The coasts swarm with seals, various kinds of fish, and vast flights of water-fowl. The interior, which is partly covered with stunted shrubs, short grass, and moss, is frequented by reindeer, white bears, ermines, and Arctic foxes. In 1596 Nova Zembla was reached by Barentz who wintered there. It was circumnavigated by Johannesen in 1869 and 1870, and the Kara Sea found comparatively free of ice. It was again circumnavigated by Captain Carlsen in 1871, and partially explored by Lieutenants Weyprecht and Paver in the same year, and again in 1872-4. Other explorations have been made since, and two or three settlements of Samoyedes have been established. Pop. about 100.

**Novalis**, *nō-vā'lis*. See HARDENBERG, FRIEDRICH VON.

**Novara**, Italy, (1) a town, capital of the province of Novara, situated between the Agogna

and Terdoppia, 51 miles northeast of Turin. It has an ancient and magnificent cathedral with a lofty tower, an episcopal palace, two colleges, a ruinous old castle, and a remarkably fine market-house. The manufactures include sweet biscuits, which have a large sale. The rice and grain markets are the most important in Piedmont. Pop. about 50,000. Novara is famous for the battle fought there on 23 March 1849, between the Sardinians and Austrians, in which the former were completely defeated, and Charles Albert, in consequence, abdicated in favor of his son Victor Emmanuel. (2) The province consists generally of a large and fertile plain, watered by the Po and several of its tributaries, and well adapted for the growth of rice. Pop. about 750,000.

**Novatianism**, *nō-vā'shī-an-izm*, the doctrine of Novatianus, a priest of the Church at Rome in the 3d century. Novatian had been a Stoic philosopher and carried out the stern, harsh views of that sect in his ministry as a Christian teacher. The schism called after him originated as follows: After the Decian persecution, a controversy arose about the manner of dealing with those who apostatized before the threat of torture or death (*lapsi*). Novatian at first inclined to advocate their absolution after due penance, but when Cornelius, the Roman bishop, followed this course, Novatian opposed his authority, and was chosen and ordained bishop by three country bishops in opposition to Cornelius, and thus became the first anti-pope. He was condemned in councils at Rome and Carthage. The party who shared his views were called Novatians. They held that, in the case of idolatry through fear of persecution, the Church could not absolve the penitent; and this doctrine they extended, at a later period, to all grievous sins. They claimed for themselves a character of especial purity, and assumed the name Puritans (*Cathari*). Their views continued to be taught in Italy and Africa up to the 6th century. See CYPRIAN.

**Novel**, *The*. The word novel (derived from the Latin adjective *novella*, feminine of *novellus*, Italian and Spanish *novella*, French, *nouvelle*) signifies literally, when applied to fiction, a new tale, new story, or new anecdote: that is, one never told before, or at least one never heard before by the listener. Since the early period of the renaissance, the word, in its slightly variant forms, has been employed in most of the literatures of western Europe, except English, to denote a short fictitious narrative dealing mainly with the incidents and intrigues of ordinary life, and written usually, though not invariably, in prose. This was also the English usage in the 16th century when collections of Italian *novelle* were first translated into English, either directly or through the French. But during the next century, the short tale of the Italian type underwent in English large expansion: and the word *novel*, naturally enough, was still retained as the name of the longer narrative, which by the time of Richardson had assumed, to a degree, the structure of the drama and the amplitude of the epic. *Clarissa Harlowe*, eight volumes in the whole, was called a novel. For a certain class of fictions we have also had since the time of Chaucer and before him the term



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*romance*, which (derived from the Latin adjective *romanicus*, through the adverb *romance*, "in the Roman fashion") meant at the outset anything composed in the *lingua romana*, that is, in the vulgar Latin tongue, like Provencal, French, or Italian. As the early productions in the languages that sprang from the Latin were, in large measure, verse-narratives of love and adventure, the word *romance* became the general term for them. When at a later period, on the invention of printing and thereabout, these verse-tales were reduced to prose, it was natural that the old word should cling to them. Wherefore it is that *roman* in French and German (*romanzo* in Italian) is to this day the most general term for a prose-fiction, while *nouvelle* or *novelle* is reserved, in the Italian way, for a short story. In English (and also in Spanish) the case is just the opposite. With us, a prose-fiction, whatever its length, which deals realistically with actual life is called, in criticism and conversation, preëminently a novel. A prose-fiction which deals with life in a fantastic manner, or represents it in the setting of strange, improbable, or impossible adventures, or idealizes the virtues and the vices of human nature, is called a romance. 'Tess of the D'Urbervilles' is a novel. The 'House of the Seven Gables' is a romance. Likewise 'Henry Esmond' is an historical novel, while 'Ivanhoe' is an historical romance.

These distinctions; historical in origin, it will be well to bear in mind. But for the broad treatment of the theme now in hand, the novel must be made to include many fictions in prose and some in verse that do not fall strictly within the meaning of the term. Novels may be divided into two classes. There is, said Stevenson, the novel of incident and the novel of character. In the novel of character, the interest is directed to the portrayal of men and women; and the tale, the story, or the yarn is a subordinate consideration. This type of fiction has no date earlier than 'Don Quixote'; it was made a fashion by Richardson and Fielding. In the novel of incident, the interest is directed to what happens; characters, if there be any at all, come only by the way; the tale, the story, or the yarn is the main thing. As folk-tales, this type of fiction belongs to all races and peoples in a primitive state of civilization. As a cultivated literary form, it commonly follows the break-up of the primitive epic. After 'Beowulf', the 'Nibelungenlied' and the 'Chanson de Roland' come, for example, the romance of King Arthur and the Knights of the Round Table. [Consult Ker 'Epic and Romance' (London and New York, 1897).]

*The Orient*.—For centuries before the invention of printing, the professional story-teller was everywhere a most important figure—in the east as well as in the west—and he still retains much of his ancient prestige among all peoples where the habit of reading has not become generally diffused. If he appears first in Egypt, it is simply because the records of Egyptian civilization are the most ancient of all. Just as at later times in the west, tales centered around Charlemagne or Richard the Lionhearted, so it was in Egypt. Among the débris of a most ancient cycle, are three short stories known as the 'Tales of the Magicians.' On a day in the third millennium before Christ,

Cheops, the builder of the great pyramid, suffering from ennui, called his three sons into his presence that they might entertain him with the wonders wrought by famous magicians. One tells of a crocodile which a magician made of wax and threw into the river, where it seized and carried away the lover of the magician's faithless wife, as he was out for an evening bath. This story is, so far as content goes, very like a mediæval *fabliau* or *novella*. Another relates that when King Sneferu was one day out on the lake of his palace with the maidens of his court, one of them lost a jewel from her hair, which was recovered by a magician who parted the waves and laid bare the bed of the lake. It is an exceedingly pretty tale. The last son tells of a magician who neatly restored the heads of animals after first cutting them off. Throughout these stories, the most ancient of the world, appears frequently "the chief reciter," who was a sort of master of the revels. In the story-telling of succeeding dynasties, magic gave way more and more to adventure, and the description of manners, especially among the peasantry. 'The Shipwrecked Sailor' (XIIth dynasty) is the Egyptian 'Robinson Crusoe.' 'The Doomed Prince' (XVIIIth dynasty) is a tale of romantic love. The prince, as in many of our popular romance, obtains the princess for his wife by climbing up to the window of her palace supposed to be inaccessible. And 'Anpu and Bata' (XIXth dynasty), the first part of which runs on the *motif* of Joseph and Potiphar's wife, has a beautiful pastoral setting. What one misses in Egyptian, as in all other ancient fiction, is the portrayal of character, except on the simplest lines.

In India the beast-fable, the fairy tale, the adventure, and the love-intrigue have been current from the earliest times. Stories of these several types were, in the old time, usually fitted into the frame work of a single narrative after a very elaborate plan. Bearing most closely upon the fiction of the west is the 'Panchatantra,' a book of fables in which the ways and conduct of men—their friendship, disputes, craft, jealousies, and virtues and vices in general—are frankly transferred to the lower animals, the bull, the lion, the crow, the owl, etc. These stories, always didactic in aim, abound in humour, irony, and satire. Translated from the Sanskrit into the literary language of Persia in the sixth century of our era, the book passed thence into Arabic about 750 A. D., under the name of the 'Fables of Bidpai'; and finally through the Latin into the modern literatures of western Europe. More remote from our subject are the 'Vetāla—panchavimcati,' a group of 25 fairy tales, well known in English under the title of 'Vikram and the Vampire'; and the 'Katha-sarit-sāgara,' or 'Ocean of Rivers of Stories,' an immense collection of verse-tales of various kinds, composed by Somadeva, a Kashmirian poet of the 11th century. Interesting also as approaching somewhat to the modern picaresque story of low life is the 'Dasa-kumāra-carita' (composed by Dandin in the 6th century), which tells of the adventures of ten princes. Finally, out of Arabia came to the west 'The Book of the Thousand Nights and a Night,' a work in its kind as great as either of the Homeric epics. This treasure-house of stories consists of beast

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fables, longer and richer in incident than those of India, beautiful tales of magic and fairy land, and histories and historical anecdotes which localize the scene. Over all is the glamour of the moon-lit night and the beautiful princess who relates them. Some of these stories had doubtless been recited for centuries by the professional raconteur, called in Arabic the *rawi*. 'Sinbad the Sailor,' for example, may be older than the 'Odyssey.' But the collection as a whole (which is based upon a Persian original of the 10th century) did not assume definite shape until the 13th century of the Christian era: and the famous 'Ali Baba' and 'Aladdin' exist in no manuscript earlier than the 16th century. Translated first into French and then into English and every language of the west, the 'Arabian Nights,' after scores of imitations, passed into romantic fiction and became a part of it. Scott's 'Talisman' would have been quite different but for this precious inheritance from the east.

The Greeks likewise added to the treasure-house of fiction. Their myths, epics, histories and biographies contained, from Homer to the end, elements clearly novelistic or romantic. The 'Odyssey,' for example, is a skipper's tale, one of many, made beautiful by weaving into it stories, long afloat, of Circe, Calypso, Polyphemus, the lotus-eaters, and the fairy realm of the Phæacians. Though we call it a hero-epic, it is really much like a mediæval romance of adventure. Plato was an admirable story-teller, as well as philosopher. Like Defoe he knew how to give an air of reality to fiction by an accumulation of details, not neglecting to tell by the way how he came by his story. The 'Republic' is perhaps too philosophical in aim for more than mention here. But it is the starting point of the scores of Utopias of western Europe from Sir Thomas More to Mr. H. G. Wells. Xenophon all but discovered the historical novel. In his 'Cyropædia,' he took for his hero the elder Cyrus as representative of a king who by self-control and vigorous self-training became ruler of the world. Running through the romance is a pretty oriental tale, which tells of the beautiful captive Panthea, tempted by Araspes, but faithful to her husband Abradates. The 'Cyropædia,' which was translated into French and English in the 16th century, became a model for historical fiction before Scott and gave great impetus to the creation of perfect gentlemen like Sir Charles Grandison. So much and much more may be said for the fiction of ancient Greece. Besides Plato's and Xenophon's, there were many other political, philosophical, and historical tales. All along ran the novelistic treatment of heroic legend; moral allegories were at one time the fashion, and with the exploits of Alexander in India came many geographical wonders and several freely invented biographies of the hero himself, which eventually resulted in the Alexander novel or legend, well-known from its later development by the French poets of the 13th century.

The Greek novel as a cultivated *genre* wholly distinct from other literary forms belongs, however, to a period subsequent to Alexander; to Greece in its decadence after the glory of her letters had departed, when the center of culture was no longer Athens but Alexandria and the

cities of Asia-Minor. Then the erotic tale of adventure took the place of the verse-epic. Of this type the oldest extant specimen is the so-called 'Nimrod Fragment' (1st century, A.D.), which has as subject the love of Nimrod, the legendary founder of Ninevah, for a maiden who may be identified perhaps with Semiramis. The motive for the hero's bravery is not unlike that in the mediæval romance of chivalry. Antonius Diogenes, the Jules Verne of the Greeks, wrote of 'The Marvelous Things Beyond Thule' (2d century), descriptive of a voyage to the North Pole, a descent into Hades, and travels in the sun and moon. To the same century belongs the 'Babylonica' of Jamblichus, a Syrian, so-called because its scene is in and near Babylon. The 'Ephesiaca' of Xenophon of Ephesus (3d century) is built in part on the *motif* of 'Romeo and Juliet.' 'Apollonius of Tyre' (3d century), known in English since the Anglo-Saxon period, furnished the plot of Shakespeare's 'Pericles.' 'Clitophon and Leucippe' by Achilles Tatius of Alexandria (5th century) abounds in marvels, gorgeous descriptions, and metamorphoses. Best of all in this kind is the 'Ethiopica, or Theagenes and Chariclea' by a Syrian who called himself Heliodorus (5th century). The boy and girl lovers, after separation, adventures, and miraculous escapes, are finally united and live happily ever after. The involved and complicated structure of this tale was taken over into western fiction by Sir Philip Sidney and the French romancers. One beautiful Greek prose-pastoral of the same period has survived: the sweet and sensuous 'Daphnis and Chloë,' the far distant shadow of 'Paul and Virginia.'

The impossible adventure of the Greek tales, especially of the class represented by 'The Marvelous Things beyond Thule,' did not escape the wit and banter of Lucian, the orator and rhetorician. In his 'True History' he sailed with his mariners beyond the pillars of Hercules, on to the moon and morning star, and to the Elysian fields, where he met with the Homeric heroes. "I know what I am saying is incredible," he stops to remark by the way, "but I shall proceed notwithstanding." Lucian was the model of the burlesque romancers from Cervantes to Fielding. Of grotesque adventure in real life, we have from antiquity one fine example in 'The Golden Ass' of Apuleius (2d century), which, though written in Latin, is thoroughly Greek. Aside from its burlesque, the novel contains scenes of coarse and brutal manners mixed with descriptions and episodes of entrancing beauty, like the story of Cupid and Psyche, than which nothing more beautiful has survived for us from ancient romance.

*Mediæval Romance.*—The Romans had nothing of their own much like a novel, except perhaps the 'Satiricon' of Petronius Arbiter, descriptive of dissolute life in the time of Nero. Their tales and fables were little more than an adaptation of the Greek. But their language, both written and spoken—in Italy, Spain, and Gaul—became the chief medium through which ancient fiction passed to the new nations of the west. The tradition, literary as well as oral, was never quite lost in the darkest period of the middle ages. Another source of transmission was the Crusades, when met the east and the

west. Many a mediæval tale, clearly Greek or oriental in origin, was brought home by the Crusader and told to one and another until some one put it down in writing. The flourishing period of mediæval romance is included in the years between 1150 and 1400. It was then that the poets developed, from Latin sources, the sagas of Alexander, Troy, and the elaborate romance of Troilus and Cressida. The new nations possessed, too, their own myths, traditions, and legends. Charlemagne and his peers became the heroes of a romantic cycle; and the French poets, working over Celtic matter, produced the great stories of Arthur, Lancelot, Guenevere, and the Round Table. Most like the modern novel were the French *romans d'aventure*, which are only loosely connected with traditions and may cut themselves wholly free. There are extant scores of these verse-romances, both in French and in English, like 'Guy of Warwick' slightly Saxon in setting, 'Havelok the Dane,' 'King Horn,' and 'Gawain and the Green Knight,' which is one of the best. Certain of them, Greek or eastern in *motif* or outline, turn upon disguises and beautiful recognition-scenes at the close, just as in Shakespeare's 'Twelfth Night' or 'As You Like It.' Such for example, are the 'Life of Ipomydon' and 'Amis and Amile.' The flower in this kind is 'Aucassin et Nicolette' (part prose and part verse), the story of two lovers of Provence, who, as in Greek romance, are separated to be brought together in happiness at the end. By the side of this charming story may be placed also the less known 'Chastelaine de Vergi,' which announces the intense tragic passion of 'Romeo and Juliet.' More realistic in aim were the *fabliaux*, short poems usually, which dealt with a trick or humorous incident in ordinary life for the purpose of exciting laughter. The main incidents of these tales, mixed with beast-fables, were in many cases transmitted from the east. A point of diffusion was the 'Disciplina Clericalis,' a collection of 26 stories in Latin prose, made by Petrus Alphonsus, a Spanish Jew of the 12th century. Its great successor was the 'Gesta Romanorum' (13th century). Tales of intrigue drawn from these and other sources, when lightly treated in verse, were called *fabliaux*; if neatly turned into Italian prose, they were called *novelle*. At the end of the middle ages stands Chaucer, who, gathering up all the current types of fiction, breathed into them the spirit of a delightful personality. On the way to Canterbury, the knight begins the story-telling with a gorgeous romance of chivalry, the squire stops midway in a tale of eastern marvels, the prioress relates the legend of a saint, and the pardoner is ready with an oriental apologue. The Reeve's tale is an expanded *fabliau*, and the priest's story of Chanticleer and Dan Russell the fox is a *fabliau* and beast-fable in one. Near Chaucer stands Boccaccio, who in the merry *Decameron* retold in prose the older *fabliaux*, giving thereby vogue to the *novella*. [The various types of mediæval fiction are described by Gaston Paris, in 'La Littérature Française au Moyen Âge' (2d ed., Paris 1890). Symonds' 'Renaissance in Italy' contains an account of the Italian *novelle* (vol. V, London 1881).]

*Caxton to Richardson.*—As in the orient, the mediæval story of western Europe, whether in

verse or in prose, was for the most part something to be related by a professional reciter or others in the gathering of friends, in public squares, or in the stately assemblies of lords and ladies. In the longer tales, verse was the more common inasmuch as rhyme was an aid to the memory. There were, however, persons who preferred to read by themselves the current fictions. For this public, various verse-romances about Arthur, Lancelot, and the Holy Graal were remodelled and expanded, as early as the 13th century, into an immense prose-narrative. The habit of reading, already begun, was greatly extended by the invention of printing, with the result that the old verse-romances were everywhere turned into prose, and the short prose-tales were expanded into narratives that might assume the magnitude of an epic or a saga. Conspicuous instances of this transformation are Malory's 'Morte Darthur,' a compendium of Arthurian romance, and the French 'La Fleur des Batailles,' a Charlemagne romance in which Ogier the Dane is the hero. These are but two out of hundreds of examples of what was taking place wherever the printing press was set up. To Caxton and the noble printers that followed him, we are indebted for the creation of a prose style suitable to the novel.

The most striking innovations were made at first in the Spanish Peninsula. Out of a Portuguese verse-romance of adventure there grew up in the 15th century, by accretions from many sources, the famous prose 'Amadis of Gaul,' to which final form was given by a Spanish writer named Montalvo. In its outer structure *Amadis* differs from similar mediæval tales of knightly adventure, in that the narrative drifts on, as in Greek romance, to the marriage of the hero and the heroine. It was the first and the best of the modern romances of chivalry, which soon became so numerous as to fill the library of Don Quixote. In a like manner mediæval verse-pastorals were turned into prose, though they usually still retained some mixture of verse. Among the first of them was the Italian 'Arcadia' (1504) by Jacopo Sannazaro. The type was further developed in the Spanish Peninsula by George of Montemayor, whose 'Diana Enamorada' set the fashion for France and England. It was in Spain, too, that some one first had the happy thought of placing behind the scenes of contemporary life a picaresque to let him relate what he saw there. These so-called picaresque novels, or romances of roguery, began with the anonymous 'Lazarillo de Tormes' (1554) and were popular for a full century. Always realistic in aim and straightforward in movement, the romances of roguery were important forerunners of the modern novel. Akin to them and of still greater significance, was 'Don Quixote,' a vast prose-epic, written in burlesque of the romances of chivalry, but carrying along with its banter humorous descriptions of contemporary manners. Don Quixote and his Squire Sancho Panza were by far the most elaborate characters that fiction had yet produced. And no work comparable with that of Cervantes was to appear again in Spain or elsewhere for more than a century.

In France and Italy, the novelistic literature chiefly cultivated at this time, aside from redactions of the older romances and tales, was the

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*conte* or *novella*. Collections of these short stories were sent forth from nearly every city of Italy, and the 'Heptameron' of Margaret of Navarre became a close rival to Boccaccio's 'Decameron.' The great humorist was Rabelais, who made the farcical adventures of Gargantua and Pantagruel the occasion for social satire, weaving into his story as he went along many a coarse jest in the vein of the old *fabliaux*. He was followed by a group of imitators who tried to outdo him in ribaldry and buffoonery, but none of them possessed his immense learning and keen intelligence.

In Elizabethan England, men and women turned to fiction for amusement as well as to the drama. Beginning with Painter's 'Palace of Pleasure' (1566), the Italian *novelle* came into English in shoals; the best of the Greek romances were translated from the French; and the Spanish romances of chivalry, pastorals, and rogue-stories were known in part. And whatever England took was worked over into fictions in harmony with her own society. For its wide scope Sidney's 'Arcadia' stands first with its noble chivalry and beautiful pastoral scenes, set in the complicated framework of the Greek 'Ethiopica.' Of slighter texture but none the less beautiful is Lodge's 'Rosalind,' which Shakespeare dramatized in 'As You Like It.' John Lyly's 'Euphues,' highly moral in tone, initiated the romance for the lady's boudoir. Robert Greene, the dramatist, supported himself by writing short tales, such as 'Menaphon,' which he called "love-pamphlets." Of all Elizabethans, Greene was by much the most fertile in incident. Two of his stories 'Pandosto' and 'Philomena' were freely used by Shakespeare for 'A Winter's Tale' and 'Cymbeline.' Very curious are Greene's attempts at historical romance, like *Ciceronis Amor*, descriptive of "the loves of Cicero which Plutarch and Cornelius Nepos forgot in their writings." Greene also wrote several pamphlets dealing with beggars, rogues, and sharpers; but in this kind he was surpassed by Thomas Nash, who ridiculed his rival's love-pamphlets and ironically alluded to him as "the Homer of Women." Nash's 'Unfortunate Traveller or the Life of Jack Wilton' (1594), which relates the adventures and escapades of a young courtier on the continent, was the most carefully wrought of the English romances of roguery.

After the passing of the Elizabethans and of Cervantes (1616), the main stream of European fiction shifted for a century to France. The English 'Arcadia' and the Spanish 'Diana' were more than matched by the 'Astrée' (1610-27), an immense pastoral covering some 5,000 pages, begun by Honoré d'Urfé, and completed after his death by his secretary. Several writers turned to history for a setting to their romances. In 'Cléopâtre,' 'Cassandre,' and 'Pharamond,' La Calprenède dealt in turn with Egypt, Persia, and the legendary founder of the French monarchy. He was succeeded by Scudéri, best known for the 'Grand Cyrus' and 'Clélie, ou Histoire Romaine.' In all cases, historical scenes, incidents, and characters were merely a disguise for a portrait of contemporary society. Scudéri's 'Cyrus,' for example, was drawn for the great Condé, and her Babylon was the Paris of her time. Near the end of the line

came Madame de la Fayette, whose 'Princesse de Clèves' has long been regarded as one of the classics in French fiction. Along with their pastorals and histories, the French continued to cultivate the stories of bourgeois life in line with the older *conte* and *fabliau*. Such were Sorel's 'Francion,' Scarron's 'Roman Comique,' and Furetière's 'Roman Bourgeois,' in which the aim was, to some extent, the ridicule of contemporary manners in low life. Burlesque in the style of Cervantes or Lucian made its appearance in Sorel's 'Berger Extravagant,' a hit at the 'Astrée,' and in Boileau's 'Héros de Roman,' descriptive of the descent of Scudéri's heroes into Hades to be flogged and cast into Lethe.

Through translation, the ponderous French romances became almost as popular in England and Germany as in the land of their birth. In both countries coteries of fashionable men and women were formed for reading and studying them as if they were all classics. Occasionally there was an imitation, like Roger Boyle's 'Parthenissa' or John Crowne's 'Pandion and Amphigenia.' Outside of their influence was Grimmelshausen's 'Simplicissimus,' the first of the German realistic novels, which described the adventures of a vagabond during the awful desolation of the thirty years' war. In this novel the picaresque element is quite apparent as well as in the 'English Rogue' \* \* \* A Complete History of the Most Eminent Cheats of Both Sexes,' composed jointly by one Richard Head and Francis Kirkman, a London bookseller. Mrs. Aphra Behn, the dramatist, set the fashion in England for scandalous tales of high life. Among her successors were Mrs. Mary Manley and Mrs. Eliza Haywood. Quite apart from these immoralities was Mrs. Behn's 'Oroonoko,' which gives a realistic account of a royal slave barbarously put to death at Surinam, where the author had lived for some years.

Interesting as much of this 17th century fiction may be, it is, with the exception of the 'Princesse de Clèves' and now and then another story, affected in style and involved in structure. A better and plainer narrative came with Bunyan's 'Pilgrim's Progress,' the newspapers, the biographers, and the essayists. Steele and Addison described clearly scenes in London and the provinces; they deftly sketched and contrasted men and women as they knew them, with agreeable banter of prevailing absurdities in dress and conduct. In doing this they were really nearer to the modern novel than the romancers and the storytellers. And so was Defoe. He and Swift wrote the language that men speak in ordinary discourse, making fiction seem like truth. 'Robinson Crusoe' is indeed our 'prose Iliad.' Except for minor details, we have no better narrative in English; and the hero is a typical Englishman of the class to which he belongs, behaving as an Englishman should behave if cast upon a desert island. In France, the Spanish picaresque novel was at this time cleverly employed by Le Sage in his 'Gil Blas' for social satire; and Marivaux, in a novel called 'Marianne' began the delicate analysis of emotion. Not to be forgotten, too, is 'Manon Lescaut,' by the Abbé Prévost, a charming tale on the "divine" right of passion.

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*Richardson to Scott.*—For centuries, stories, tales, and romances of all sorts had been set adrift; contemporary manners had at times been depicted under the guise of history and the pastoral life, and from the standpoint of rogues and adventurers. But no one, not even Cervantes, had ever been able to keep before him for long the ideal of the novel as we now understand it: to wit, the direct and faithful portrayal of character amid the scenes of real life. Strange to say, too, no one had ever seen that for this end much might be learned from the drama, that a narrative might be made closely and logically dramatic. These discoveries were left for Samuel Richardson, a London printer of no rank and little schooling. The interest in his first novel, to which he gave the name of *Pamela* (1740), centers about the distress of a beautiful waiting-maid of humble birth. Her mistress dies and then the son and heir tries to win her to a dishonorable alliance. After a protracted struggle of will against will, the young man repents of his evil-doing and marries the young woman whom he would have betrayed. It is a simple story that may be told as here in two or three sentences. But for his treatment of the theme Richardson required two volumes, to say nothing of a continuation. During and after each struggle there were sensations to record; many characters had to be introduced as participants in the action; and the whole narrative was made to move from incident to incident with the logic of the drama, up to a climax and on to a catastrophe. When he had done with '*Pamela*,' Richardson had created, perhaps without being aware of it, a novel from which characters emerge as clear and definite as from the drama, and in much greater detail. Richardson attained to his full statue in '*Clarissa Harlowe*,' wherein a tragic theme is unfolded with great skill. His career closed with '*Sir Charles Grandison*.' The plots of the three novels were developed, oddly enough, by imaginary letters, which pass to and fro between the more important characters.

The formula of the novel once discovered, it was easy for a man practised in letters to improve upon the humble printer. Henry Fielding, essayist and playwright, wrote '*Joseph Andrews*' to show Richardson what a novel ought to be, and afterwards went on with '*Tom Jones*' and '*Amelia*.' Fielding was a great humorist in direct descent from Lucian and Cervantes. The novel, as he understood it, was an immense comic-epic running on in the well-polished grooves of the drama, but suspended at intervals that the author might converse with the reader about his art, his fame, and the conduct of his characters. Knowing England better than any other man of letters in his day, Fielding conveyed the wealth of that knowledge into characters like Parson Adams, Squire Western, and Tom Jones, who always stand out full and complete. While the great master was at work on '*Tom Jones*,' Tobias Smollett took the field with '*Roderick Random*,' our first novel of the sea, which was followed by '*Peregrine Pickle*'; '*Count Fathom*'; '*Sir Launcelot Greaves*'; and '*Humphry Clinker*.' If Fielding was a comic writer who delighted in exposing to ridicule vanities and affectations, Smollett

was a satirist who lashed hypocrisy and the darker vices with the glee of a madman. He had in him also the spirit of fun, which welled up splendidly in '*Humphry Clinker*,' "the most laughable story," said Thackeray, "that has ever been written since the goodly art of novel-writing began." In the meantime Oliver Goldsmith had condensed the Richardson novel and given it a charming background in country life. From the '*Vicar of Wakefield*' dates the brief pastoral-tale since common throughout Europe. Perhaps Laurence Sterne should not be classed with the novelists. He was rather a humorist who played with the novel. '*Tristram Shandy*' is a sort of novel written backwards. After setting out with the prenatal history of his hero, Sterne drops him and reverts to Tristram's uncle and father and elaborates their characters, without much attention to the main story. Of orderly narrative Sterne was, however, a master when he chose to be, as in the death of Yorick and throughout the '*Sentimental Journey*,' which is a record of his emotions on a tour through France, from Calais to Paris and on through Languedoc in the vintage season. Sterne's art at the best was exquisite and wonderful, whether in the minute delineation of Walter Shandy and my uncle Toby or in the minor emotional portraits of his sentimental travels. Translated into French, German and other languages, Richardson and Sterne reinforced the stream of emotional literature on the continent. For France the outcome was Rousseau's '*Nouvelle Héloïse*,' and, at a latter date, Saint-Pierre's '*Paul et Virginie*,' Chateaubriand's '*René*' and Madame de Staël's '*Corinne*.' For Germany the outcome was a long line of sentimental novels at the head of which stood Goethe's '*Leiden des jungen Werther*.'

Owing to changed social conditions, the novel broke up into new types after the death of Sterne. Among large numbers of people in England and France, interest in the comedy and tragedy that grow out of love and intrigue gave way, in the years before the French Revolution, to the larger social and political relations and to theories of education and government. The novel at once became the popular medium of current speculation, incorporating into itself the tract, the pamphlet, and the treatise. The novel of distinct purpose which began with Rousseau's '*Emile*,' was continued by many English writers including Thomas Holcroft and William Godwin, the author of '*Caleb Williams*.' In other hands the novel absorbed romance. The so-called Gothic romances all sprang from '*The Castle of Otranto*,' a nightmarish tale by Horace Walpole. Among Walpole's successors were Clara Reeve; Mrs. Ann Radcliffe, author of the '*Mysteries of Udolpho*'; 'Monk' Lewis; and Charles Brockden Brown, the American. In Germany there was a similar tendency to romance and superstition as illustrated by the work of Tieck and Hoffmann.

Meanwhile, a group of novelists, mostly women, held more nearly to older traditions. '*Evelina*' and '*Cecilia*' by Frances Burney (afterwards Madame d'Arblay) brought the public back to London—to assemblies, Ranelagh, the opera and Drury Lane, where thronged the world of fashion with nothing to do. With

Miss Burney began the novel of manners in the most restrictive meaning of the phrase. Hitherto characters had been differentiated by *what* they said and did. Miss Burney laid equal stress upon *how* they spoke and *how* they behaved, upon tone, look, and gesture. From her art it is an easy transition to the character-types of Maria Edgeworth. One may pass by, good as they are, Miss Edgeworth's tales of fashionable life and various fictions in which she sought to reform English society from top to bottom, for her stories of Irish life such as 'Castle Rackrent' and the 'Absentee,' wherein first appeared the Irishman as he really is, behaving himself in those ways that seem so absurd to an Englishman, and engaging in no long conversation without one or more of those delightful blunders in speech known as Irish bulls. From Miss Edgeworth's sketches, as she called them, flowed all these Irish tales which for the next fifty years flooded England. Miss Burney and Miss Edgeworth shared one defect, for neither of them knew how to manage a story. Their many natural and vivacious scenes are more or less detached and never firmly held together. But the art of Fielding, long since lost, was now to be regained and refined by Jane Austen, a woman of gentle breeding and charming style. Her first novel to be printed was 'Sense and Sensibility;' then followed 'Pride and Prejudice,' 'Mansfield Park,' 'Emma,' 'Northanger Abbey,' and 'Persuasion,' of which the best is the novel one happens to be reading. The scenes of them all were laid in South England, where Jane Austen passed her life. Without employing the conventional devices of the novelist, she was able to awaken interest by the manner in which she developed her story, the nice discrimination between men and women much alike to the ordinary observer, and the wit and irony that accompanied the entire performance. Jane Austen was in a sense the last of her line, completing the work of Miss Burney and Miss Edgeworth; she also set the clock to the delicate impressionism of the nineteenth century.

*Sir Walter Scott.*—Scott, equally with Richardson, marks an epoch in the course of European fiction. From the earliest times, as in Egypt and Greece, history had been an adornment to the tale or story. Shakespeare and many others had written historical dramas. The French romances of the 17th century, many of them, were historical allegories. The Gothic writers laid their scenes in mediæval or early modern times. With several romancers just before Scott, history was a still more definite aim, especially with Jane Porter, author of the 'Scottish Chiefs.' But none of Scott's predecessors had the historian's perspective. None of them did much more than project the present into the past. Scott's aim was to restore as carefully as he could the manners and customs of our forefathers, to tell as how they behaved under the stress of civil and political commotions. The historical novel, as Scott organized it, was, then, the novel of manners pushed back, at first one or two generations, and eventually to the middle ages. He began, in 'Waverley' (1814), with Scotch scenes; and after exhausting interest in Scotland, he crossed the border, writing 'Ivanhoe;' then he crossed the channel, writing 'Quentin Dur-

ward;' and finally he went on to the east, to the camp of the Crusader. All Europe stood in admiration of the extraordinary feat. Scott was clearly the founder of the historical romance. His numerous imitators in England included Horace Smith, G. P. R. James, W. H. Ainsworth, and in part Dickens and Thackeray. Under Scott's direct inspiration, Cooper launched his great romances of the forest celebrating the career of Leather-Stocking; and as a challenge to the seamanship of Scott's 'Pirate,' he wrote 'The Pilot,' to be succeeded by other romances of the sea. From Scott, too, proceeded the German historical romances, from Wilhelm Häring on through Gustav Freytag and Georg Ebers. In Italy Scott's influence began with Manzoni's 'Betrothed,' and in France with Alfred de Vigny, Prosper Mérimée, and Victor Hugo. Finally, the historical romance was transformed by the elder Dumas, a writer of rare narrative and descriptive powers, into tales of breathless adventure like the 'Trois Mousquetaires.' [On Scott and the historical novel, consult especially, Maigron, 'Le Roman Historique' (Paris, 1898); and Stephen, 'Hours in a Library' (first series, London, 1874).]

*Varied Types of the 19th Century.*—By 1832, the year of Scott's death, romance had run its immediate course in England, though there were many survivals. The passage of the Reform Bill and other legislation led to a break-up of society; the older bourgeoisie fared badly, losing their homes and drifting to debtors' prisons and workhouses; and a new middle class rose to wealth and power. The manners, virtues, and vices of the new order became at once the main theme of the novelists. Bulwer-Lytton, who could write at will a history, a sentimental romance, a criminal novel, a ghost story, or a Utopia, well illustrates the transition from romance to the novel of contemporary manners. Dickens was the chronicler of those who had suffered most by political and social changes. Beginning with 'Pickwick' (1836-37), a long series of comic sketches unexcelled in their kind, he definitely struck the humanitarian note in 'Oliver Twist' (1837), which dealt, in humor and pathos, with the workhouse and the new poor-law. He thereafter passed in review private schools, public education, prison discipline, the red-tape of Downing street, delays in the Court of Chancery, graft (we should now call it) in business and the professions, and all sorts of hypocrisy and meanness that oppressed the people. Despite the sordidness of their matter, all of Dickens's novels were ennobled by the author's lofty idealism, and made delightful by a sense of humor that never deserted him. Those that were wrought out of the author's most intimate experience—'David Copperfield,' for example—were no doubt the best; but Dickens could interest when he took, as in 'Hard Times,' a subject about which he knew little or nothing. His Christmas stories were national events. Of immense creative power, Dickens added to fiction hundreds of humorous types, among which are Mr. Pickwick, Sam Weller, Micawber, and Dick Swiveller. He was, however, surpassed in fertility by his early French contemporary, Honoré de Balzac, who in the vast 'Comédie Humaine' endeavored to portray every phase of French life, traversing



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its hell, purgatory, and paradise. But what fell without the ken of Dickens was taken up by other novelists. Charles Kingsley, now better known for 'Hypatia' and 'Westward Ho!' canvassed the questions at issue between labor and capital, in 'Yeast' and 'Alton Locke,' drawing by the way vivid pictures of sweat-shops and the distress of agricultural laborers. Mrs. Elizabeth Gaskell, in 'Mary Barton' and 'North and South,' described the frightful condition of women and children in the great manufacturing towns of North England. And Benjamin Disraeli created a sensation by his trilogy, 'Coningsby,' 'Sybil,' and 'Tancred,' dealing in turn with "the state of parties," "the state of the people," and "the state of the Church of England." Disraeli's first novels, impressive for their scope, were all marked by keen intelligence, wit, and mockery. [The relation of Dickens, Kingsley, Gaskell, and Disraeli to their times is exhaustively treated by Cazamian, 'Le Roman Social en Angleterre' (Paris, 1904).]

In the meantime Thackeray was depicting, with matchless humor and irony, the ways of the well-to-do middle class to which he himself belonged. 'Barry Lyndon,' the 'Book of Snobs,' various burlesques of contemporary novelists, and a multitude of sketches were succeeded by 'Vanity Fair, a novel without a Hero.' No English novel since 'Tom Jones' had contained so much of real life. It was a humorous transcript of what was going on among the rich bankers and merchants in Bloomsbury, with some invasions into the disreputable aristocracy of Belgravia. In 'Pendennis' Thackeray described much of his own career; and in the 'Newcomes,' he returned, though taking the edge from his irony, to the theme of his first novel. Finally, he carried his realistic methods into history, writing 'Henry Esmond' and the 'Virginians,' of which the former is rightly regarded as the best historical novel in English.

'Esmond' is, however, hard pressed for first place by the 'Cloister and the Hearth,' by Charles Reade, who also wrote several admirable novels under the humanitarian impulse, such as 'It is Never Too Late to Mend.' To the same period belong Charlotte Brontë's 'Jane Eyre,' 'Shirley,' and 'Villette,' and her sister Emily's 'Wuthering Heights,' all of which are Byronic in the vehemence of passion. In the United States, Poe and Hawthorne had moulded the short-story to a beautiful form, and the latter's 'Scarlet Letter' at once took rank among the great fictions. To Anthony Trollope descended Thackeray's humor, without, however, the master's irony and genius. For 20 years Trollope was the delight of a large audience. He was the easy and amusing chronicler of every-day English life, rising to his highest powers in the tales of cathedral life, which began with 'The Warden' and 'Barchester Towers' and closed with the 'Last Chronicle of Barset.' This series of delightful novels, no doubt, suggested to Mrs. Margaret Oliphant the 'Chronicles of Carlingford,' dealing with the ways of Dissenters. 'Salem Chapel' and 'Miss Majoribanks,' among the best of them, give Mrs. Oliphant a permanent place in the course of English fiction.

With Marianne Evans, known in letters as "George Eliot," there entered into the English novel a new and profound personality. Hitherto moralists and philosophers had tried fiction with no great success. But George Eliot, besides her large acquirements from books, possessed wit, humor, and a fund of fresh observation. Beginning with 'Scenes of Clerical Life,' based upon incidents and traditions brought over from her life as a Warwickshire girl, she published in 1858 'Adam Bede,' her first long novel. It was quite different from any other novel that had ever been produced. True, it ran on the lines of the conventional story of a young woman's betrayal; but beneath the outer sequence of incident was a relentless study of motive, clearly and logically developed from beginning to end. It was the first purely psychological novel ever written. Still more impressive work followed in 'The Mill on the Floss,' 'Romola,' and 'Middlemarch.' At the same time George Meredith was finding his way to the psychological novel. His 'Ordeal of Richard Feverel' appeared in the same year as 'Adam Bede,' but his subtle psychological manner came later, in the 'Egoist' and 'Diana of the Crossways.' Narrower in his outlook than George Eliot, he took fewer characters for his studies, carrying the analysis of motive to a refinement that sometimes rendered him unintelligible. And Henry James has since refined upon Meredith. The stories whereby James first won attention were international episodes, delightfully objective in method, like 'Daisy Miller,' depicting by contrast American and European types and manners. But by 1890, he began very complex studies of unconventional phases of English life, and adopted for his purpose an involved and indirect style, with the result that most readers are now uncertain just what happens in a novel like the 'Golden Bowl,' for the incidents must be largely inferred from the characters.

It is impossible to relate here in detail what has been done for fiction on the continent since the death of Balzac. In France, Flaubert and Daudet were the great literary artists of their time. Zola, who established the vogue of 'the naturalistic novel,' described the ugliest aspects of life with a boldness never before attempted in fiction. Paul Bourget, since 1892, has been the exponent of psychology. Scandinavia's representative has been first of all Björnson. Sienkiewicz, author of 'Quo Vadis' and an impressive trilogy dealing with the struggles between the Poles and the Cossacks, may stand for Poland. Among Germany's numerous novelists are Paul Heyse, author of 'Kinder der Welt;' Spielhagen, who presented his ideal of a novel in a collection of essays on the 'Theory and Technique of the Novel;' and Sudermann, the dramatist, whose pathetic 'Frau Sorge' soon found its way to English readers. Russia produced a novelist of the first rank in Turgenieff, whose art—say in 'Fathers and Sons'—is quite beyond praise; its influence has been long potent in the west. Tolstoi, since 'Anna Karenina,' has treated current social problems in novels of absorbing interest. His novels read, not like fiction, but as if they were genuine documents on contemporary life. Tolstoi is the world's master realist.

Howells, who has often interpreted Tolstoi in brief essays, has held firmly to a realistic treatment of current types and manners, eliminating so far as possible the conventional plot which the novel early took over from the drama. His 'Rise of Silas Lapham' is by far the best American novel of the present generation. Hardy is the English novelist of most thought and substance since George Eliot. He struck the note of his stern realism in 'A Pair of Blue Eyes' and 'Far From the Madding Crowd,' and rose to the height of his genius in 'Tess of the D'Urbervilles.' Mrs. Humphry Ward gained her public with 'Robert Elsmere,' and after writing several other problem novels, shifted her theme in 'Lady Rose's Daughter' and the 'Marriage of William Ashe,' to beautiful women in risky situations. A tendency towards the abnormal in recent fiction, slightly visible in Mrs. Ward, is best represented by Mrs. Harrison's 'Sir Richard Calmady.' The intensity of Hardy's tragedy, though less well-rendered, has descended to Phillpotts, author of the 'Secret Woman' and other Wessex novels. More apart is Miss Sinclair's 'Divine Fire,' an excellent novel after the old order.

Towards the close of the 19th century, the English novel passed through a brief cycle of romance, history, and adventure. No decade and perhaps no year since Scott and Dumas had been without an historical novel or a story of adventure. In recent years Blackmore's 'Lorna Doone' had been received with delight by a wide public; and Shorthouse's 'John Inglesant,' a spiritual romance of singular beauty, had met with almost equal favor. But the novelist who revived history and adventure as a fashion was Stevenson. He became for his time a lesser Scott, though, in technical detail, he surpassed his countryman. Beginning with 'Treasure Island,' a story of pure adventure, he passed on through the ethical parable of 'Dr. Jekyll and Mr. Hyde' to 'Kidnapped,' 'David Balfour,' and the 'Master of Ballantrae,' which were tales of adventure in an historical background after the style of Dumas. These and other tales and short stories, admirable in form and style, and revealing a charming personality, won the hearts of the critics as well as of the larger public. As in the case of Scott, Stevenson was accompanied and followed by scores of historians, among whom were Conan Doyle, S. R. Crockett, Stanley Weyman, Anthony Hope Hawkins, Weir Mitchell, Mary Johnston, Gertrude Atherton, and Winston Churchill. Most of this work, though there are exceptions, is mechanical in execution and is destined to pass quickly into oblivion. But Maurice Hewlett especially has made an interesting psychological study of Mary Queen of Scots under the title of the 'Queen's Quair,' and in the 'Forest Lovers,' 'Little Novels of Italy,' and 'New Canterbury Tales,' he has revived in his own beautiful way the spirit of the renaissance and the middle age.

No less interesting than the recrudescence of romance has been the exploitation of remote districts and countries for fresh material, until the earth has now become well-nigh exhausted. First of all comes to mind Kipling, who revealed India in tales of wonderful vigor and insight, like those in collections named 'Soldiers Three,'

'Phantom Rickshaw and Other Tales,' 'Many Inventions,' and in 'Kim,' a longer novel, while his 'Jungle Books' have given rise to an extensive animal literature. Conrad has carried the novel to the Malay Peninsula; and Hornung to Australia. Hichens has described an oasis in the Sahara and the road to Timbuctoo. Coming nearer home, Barrie and Watson have discovered the humor and pathos of the peasantry of Scotland. In the United States, the novel of provincial character has been long practised by Mary Wilkins Freeman, Sarah Orne Jewett, Mary Murfree, Bret Harte, G. W. Cable, T. N. Page, Hopkinson Smith, and scores of others. Throughout the long period Mark Twain has been the supreme humorist. Recently Owen Wister and Hamlin Garland have invaded the northwest, and Elizabeth Robins Parkes has written of the Klondike. Other contemporary writers must be passed by, though in many cases they deserve mention here for their talent and sincerity. Striking narrative power is possessed, for example, by H. G. Wells and Jack London.

The 20th century opens with a remarkable vogue of the short-story, so well adapted to the newspaper and magazine. Short narratives in prose have been cultivated from the earliest times. Egypt and India had them long before the dawn of modern civilization. As *novelle* they were brought to high finish by Boccaccio, and ever since his time they have been frequent in all the literatures of the west. But a new type, depending less upon narrative interest than upon conveying a definite impression or an emotional state, came in with Poe and Hawthorne. Short stories of this kind, containing few characters and shorn of unnecessary incident, were exquisitely wrought by Daudet and Maupassant. Less clean-cut but admirable in their several styles are the short stories of James, Stevenson, Kipling, Hewlett, Aldrich, Edith Wharton, and many another writer. In the short story rather than in the longer novel one just now finds the best workmanship.

*Bibliography—Egypt and the East.*—The best Egyptian stories were translated into English by Petrie, 'Egyptian Tales' (2 vols. London 1895); and into French by Maspéro, 'Les Contes populaires de l'Égypte ancienne' (Paris 1889). Consult also Warner, 'The World's Best Literature' (New York 1897) for specimens. A concise account of the tales of India is given, with a full bibliography, by Macdonell, 'A History of Sanskrit Literature' (New York 1900); and a more extended account by Schroeder, 'Indiens Litteratur und Kultur' (Leipzig 1887). For specimens, consult Jacob, 'Hindoo Tales' (London 1873); Burton, 'Vikram and the Vampire' (new ed. London 1898); and 'World's Best Literature.' The most faithful translations of the Arabian Nights are by Burton (10 vols. London 1825-86, and six supplemental vols. 1887-88); by Payne (8 vols. London 1882-84), and by Lane, edited by Jacobs (6 vols. London 1808). Burton's translation was abridged by Lady Burton (six vols. London 1887-88).

*Greece.*—The standard book on the Greek novel is Rohde, 'Der Griechische Roman' (new ed. Leipzig 1900), of which a summary was made by Schwartz, 'Fünf Vorträge über den Griechischen Roman' (Berlin 1896). Con-

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sult also Salverte, 'Le Roman dans la Grèce ancienne,' Dunlop, 'History of Prose Fiction' (rev. ed. London and New York 1888); Warren, 'A History of the Novel previous to the 17th Century' (New York 1895). For translations, see 'Greek Romances,' and the 'Golden Ass' of Apuleius in Bohn's Library, and the 'Works of Lucian' translated by Fowler (Oxford 1905).

*England.*—Cross, 'Development of the English Novel,' a summary of English fiction from mediæval romance to Kipling (new ed. New York 1905). Dunlop, 'History of Prose Fiction,' to Scott (rev. ed. London 1888); Raleigh, 'The English Novel,' to Scott (New York 1894); Jusserand, the 'English Novel in the Time of Shakespeare' (London 1890); Lanier, 'The English Novel and the Principle of its Development,' from Richardson to Eliot (rev. ed. New York 1897); Stoddard, 'The Evolution of the English Novel,' presenting a theory of development (New York 1900); and Matthews, 'Aspects of Fiction,' of the present day (New York 1896). Besides these general works covering the periods indicated, essays on special aspects of the novel are numerous in the works of Leslie Stephen, Saintsbury, James, Stevenson, Howells, and Brander Matthews. The field is well covered by Perry in 'A Study of Prose Fiction' (Boston 1902). Among works of reference may be cited Baker, 'A Descriptive Guide to the Best Fiction' (London 1903); Nield, 'A Guide to the Best Historical Novels and Tales' (3d ed. New York 1903), and Dixon, 'Subject Index to Universal Prose Fiction' (New York 1897).

*Spain.*—For the Spanish novel as a whole, consult Ticknor, 'History of Spanish Literature' (4th ed. Boston 1871), and for a brief summary Clarke, 'Spanish Literature' (London 1893). The picaresque novels are described by Chandler, 'Romances of Roguery' (New York 1899); and by De Haan in 'An Outline of the History of the Novella Picaresca in Spain' (The Hague and New York 1903). Consult also Dunlop and Warren as cited above.

*France.*—Paris, 'La Littérature Française au Moyen Âge,' for mediæval types (2d ed. Paris 1890); for 17th century, Körting, 'Geschichte des Französischen Romans in XVII Jahrhundert' (Leipzig 1885-87), and Breton, 'Le Roman au dix-septième Siècle' (Paris 1890); for the 18th century, Waldberg, 'Der Empfindsame Roman in Frankreich' (Strassburg 1906); and for the last century, Gilbert, 'Le Roman en France pendant le XIX Siècle' (rev. ed. Paris 1896); Wells, 'A Century of French Fiction' (New York 1898); and Brunetiere, 'Le Roman Naturaliste' (new ed. Paris 1892). In various essays Brunetiere has covered nearly the whole field from the beginning of the 18th century.

*Germany.*—Mielke, 'Der Deutsche Roman des XIX Jahrhunderts' (Braunschweig 1890); Rehorn, 'Der Deutsche Roman' (Köln and Leipzig 1890); and Spielhagen, 'Beiträge zur Theorie und Technik des Romans' (Leipzig 1883).

*The Short-Story.*—Specimens of tales and short stories from the Egyptian survivals to the present day are given by Jessup and Canby, with an introductory essay on the *genre*, in 'The Book of the Short Story' (New York 1903). The art of the short-story has been admirably treated by Matthews in 'Philosophy of

the Short-Story," in 'Pen and Ink' (New York 1888) and by Perry in 'A Study of Prose Fiction' (Boston 1902).

Further information on the novel may be gained by consulting the articles in this encyclopedia on the various literatures and on the leading writers mentioned in this essay.

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**Novel Constitutions, or Novels,** in law, were the supplementary constitutions of some Roman emperors, and, especially those of Justinian, so called because they appeared after the authentic publications of law made by such emperors. The Novel Constitutions (also called Novels), together with the Institute, Digest, and Code, constitute the whole body of law which passes under the name of Justinian.

**Novellette,** (1) in music a term denoting certain compositions in free form, characterized by a great number of short themes introduced without regular succession. Schumann (q.v.) was the inventor of this composition. (2) An abbreviated novel, or short work of fiction; a short story usually contains from 1,000 to 20,000 words; a novelette from 20,000 to 40,000, and a novel from 40,000 words upward.

**Novellino, nō-vē-lē'nō, II, or Cento Novelle Antiche,** a 13th century collection of Italian stories of a very multifarious character taken from every possible source, biblical, classical, chivalrous, and historical. The style is simple and natural and often distinguished by a charming naïveté.

**Novello, Vincent,** English composer; b: London, England, 6 Sept. 1781; d. Nice, France, 9 Aug. 1861. He was one of the founders of the Philharmonic Society of London, and of Novello, Ewer & Company, London music publishers. His contributions to cathedral music are valuable, and in editing the unpublished compositions of great musicians he accomplished an important work.

**November,** (from *novem*, nine), the eleventh month of our year and the ninth month of the Roman year when it consisted of 10 months. It has 30 days, and in Great Britain is generally regarded as perhaps the gloomiest period of the year. The first day of the month is All Saints Day. (See CALENDAR.) In the United States Thanksgiving Day comes in November.

**Novgorod, or Veliki-Novgorod,** ("Great Novgorod"), Russia, (1) a town, capital of the government of Novgorod, on the Volkhoff, near the point where it issues from Lake Ilmen, 103 miles southeast of Saint Petersburg. It is divided by the river into two parts, which communicate by a stone bridge. The portion of the town on the right bank contains in its centre the Kremlin, or citadel. Within it is the cathedral of Saint Sophia, built after the model of Saint Sophia at Constantinople; besides which there are numerous churches and several monasteries. The town-hall, post-office, and commercial building stand on the left bank of the river. The manufactures are of little importance, and consist of sail cloth, leather, tobacco, candles, vinegar, etc. The trade in corn, flax, and hemp, carried on chiefly with the capital, is considerable.

Novgorod was in early times the capital of an independent state. So great was its power and wealth that it excited the jealousy of the Muscovite princes, and in 1478 the Czar Ivan III. nearly destroyed the city, deprived it of its liberties, and banished its most influential citizens. On the opening of Archangel to English traders, but more especially after the founding of Saint Petersburg, the town rapidly declined. Pop. (1897) 26,095. (2) The government of Novgorod has an area of 47,236 square miles. Pop. (1897) 1,392,933, chiefly engaged in agriculture and stock-raising.

**Novibazar**, or **Novipazar**, Turkey, the capital of the sanjak of Novibazar, Kossovo, on the Rashka, 130 miles southeast of Bosna-Serai. There are no public buildings worthy of notice except the ruined citadel. It is the chief point of communication between Bosnia and Turkey; several of the chief roads of the country cross each other here. By the terms of the Treaty of Berlin of July, 1878, the liva or district of Novibazar is maintained under a dual Austro-Turkish control. Pop. 12,000.

**Novice**. See NEOPHYTE.

**Novikoff**, nōv'ikōf, Nikolai Ivanovitch, Russian author: b. near Moscow, Russia, 27 April 1744; d. there 30 July 1818. He entered the Imperial service, but soon turned his attention to literature, and became editor of the Moscow 'Gazette.' He established in Moscow a Typographical Society, whose purpose was to further inexpensive reprints of valuable books, and he also founded there the first circulating library in Russia, and in various ways endeavored to promote the cause of education. He was imprisoned for writing 'A History of the Jesuits,' and his other works include: 'The Painter', 'Russian Biographies'; etc. See Gretsch, 'Essai sur l'Histoire de la Littérature Russe.' Consult: Luginoff, 'Novikoff and the Moscow Martinists' (1867).

**Novikoff**, Olga Kireeff ("O. K."), Russian political writer: b. Moscow 1840. Her parents belonged to the nobility, and at 19 she was married to Gen. Novikoff. She removed to England and there found friends among the most eminent statesmen of the day. Her political writings, signed "O. K.," aimed to further an Anglo-Russian alliance and continued the work of her brother who was killed in the Turkish war. She has published: 'Is Russia Wrong?'; 'Friends or Foes'; 'Skobeloff and the Slavonic Cause'; etc.

**Novo Cherkaska**, nō'vō chēr-kās'kā, Russia, city, capital of the province of the Don Cossacks; near the Don River, about 40 miles from its entrance into an arm of the Sea of Azof. Anthracite coal mines and rich farm lands are in the vicinity. Two large fairs are held here each year, which bring considerable trade to the city. It has a number of manufacturing establishments, several excellent schools, and a large library. Pop. (1901) 55,000.

**Novum Organum** (literally, new method or instrument), a famous work by Francis Bacon, published in 1620. It forms the second part of Bacon's philosophical work entitled 'Instauratio Magna,' 'The Great Restoration' of Sciences. The first part, 'De Augmentis Scientiarum,' is an extension of the previous work on the 'Advancement of Learning.' The

third is the 'Historia Naturalis.' The 'Novum Organum' contains the outlines of the scientific or inductive method; namely, that of proceeding from facts to general laws, instead of inferring facts from assumed general principles which have never been proved. This latter, the philosophical and metaphysical method, was repudiated by Bacon, and together with the "superstitions" of theology, was declared to have no place in the new learning. The 'New Method,' therefore, is an attempt at an interpretation of nature from direct observation.

**Novy**, Frederick George, American chemist: b. Chicago, Ill., 9 Dec. 1864. He was graduated from the University of Michigan in 1886 and studied in Berlin. In 1891 he became assistant professor at the University of Michigan, and was several times promoted until in 1902 he was made professor of bacteriology. He was at Pasteur Institute in Paris in 1897 for the prosecution of his studies, and in 1901 he formed one of the United States commission to investigate the plague in the Orient. He has written: 'Cocaine and Its Derivatives' (1887) and several books in collaboration.

**Nowanagar**, nō-wā-na-gār', or **Nawanagur**, nā-wā-nū-gūr', India, the seaport capital of a native Gujarat state in the Kathiawar peninsula, at the mouth of the Nagna, on the Gulf of Cutch, 54 miles east of Rajkot, with which it is connected by a branch railway line. It is noted for its textile manufactures, pearl fisheries, and carries on an active export and import trade.

**Nowell**, nō'ēl, Increase, English colonist in America: b. 1590; d. Boston 1 Nov. 1655. One of the original patentees of the Massachusetts Bay Company, in 1630 he came to New England; about 1632 was dismissed from Boston because of his urging the separation of Church and State; and became one of the founders of Charlestown. He was outlawed by the English authorities for failure to appear before them. Nowell was secretary of the colony 1644-9, and was chaplain to the force sent against the Narragansett Indians. He died in poverty, but a large land grant in New Hampshire was voted by the colony to his widow and his son, Samuel (1634-88), who had distinguished himself in the swamp fight with the Narragansetts.

**Nox**. See NYX.

**Noyades**, nwā-yād, in French history, the name given to the execution of political offenders by drowning them, practised during the Revolution, especially during the Reign of Terror, by Carrier et Nantes. The method adopted was crowding the victims into a boat, withdrawing a plug in the bottom, and casting them adrift.

**Noyau**, nwō-yō', a French liqueur prepared from white brandy, bitter almonds, sugar-candy, grated nutmeg and mace, and sometimes flavored with the kernels of apricots, peaches, the peel of oranges, etc.

**Noyes**, noiz or nois, Arthur Amos, American chemist: b. Newburyport, Mass., 13 Sept. 1868. He studied at the Massachusetts Institute of Technology and at Leipsic University, and became instructor 1887, assistant professor 1894, and professor of theoretical and organic chemistry 1899, in the Massachusetts Institute of Technology. He made valuable original

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studies of the relation of the law of mass action to the solubility of salt mixtures, contributed other papers to the 'Zeitschrift für physikalische Chemie,' and wrote: 'A Detailed Course of Qualitative Chemical Analysis of Inorganic Substances' (1895); 'Class Reactions and Identification of Organic Substances' (1899, with Milliken); and 'General Principles of Physical Science' (1902).

**Noyes, John Humphrey**, American author and founder of the Oneida Community (q.v.): b. Brattleboro, Vt., 6 Sept. 1811; d. Niagara Falls, Canada, 13 April 1886. His father was a representative in Congress 1815-17, and his mother an aunt of President R. B. Hayes (q.v.). He studied at Dartmouth, took theological courses at Andover and Yale, was licensed to preach in 1833, and soon lost this license, having professed second conversion, a belief in the dual sexual nature of God, and the doctrine that the Christian is bound by no rule of duty or conduct. With these tenets and an attempted return to the communism of the primitive Church, he gathered round him a Perfectionist Community at Putney, Vt., whose practice of complex marriage forced them to migrate to Oneida, N. Y. But there, too, they outraged public sentiment, so that they gave up their peculiar tenets in 1880, and Noyes and some of his adherents removed to Canada. He wrote: 'The Berean,' which may be called the 'Bible of the Oneida Community' (1847); 'The Second Coming of Christ,' that is in 70 A.D. (1859); 'Salvation from Sin' (1869); and 'History of American Socialism' (1870). See **PERFECTIONISTS**; **ONEIDA COMMUNITY**.

**Noyes, William Albert**, American chemist: b. near Independence, Iowa, 6 Nov. 1857. He was graduated from Iowa College in 1879, and in 1883-6 was professor of chemistry in the University of Tennessee, since when he has occupied the chair of chemistry at the Rose Polytechnic Institute at Terre Haute, Ind. He has edited the 'Journal of the American Chemical Society' since 1902, and is the author of: 'Organic Chemistry for the Laboratory' (1897); 'Organic Chemistry' (1903); etc.

**Noyes, William Curtis**, American lawyer: b. Schodack, N. Y., 19 Aug. 1805; d. New York 25 Dec. 1864. He was admitted to the bar in 1827, was appointed district-attorney of Oneida County, and later established a law practice in New York. He was one of the strongest advocates at the New York bar, and earned a reputation for highest integrity, and at the time of his death was engaged in codifying the laws of the State. He willed his extensive law library to Hamilton College, Clinton, N. Y.

**Nu**, *noo*, or **Nuu** (later form **Nun**), Egyptian deity. It was from **Nun**, the primeval flood, that **Re**, the sun-god, rose to his throne over the world. **Nun** was the personification of the original and eternal stuff or protoplasm from which gods and men were formed, but in a later age represented the life-giving waters of the Nile. Consult Wiedemann, 'Religion of the Ancient Egyptians' (1897).

**Nuba**, *noo'bā*, an ethnological name given to the negro tribes of Kordofan, in Eastern Sudan. The Nubas are true negroes. Consult Stanford, 'Africa' (1895).

**Nubar Pasha**, *noo'bār pāsh'ā*, Egyptian statesman: b. Smyrna January 1825; d. Paris 14 Jan. 1899. An Armenian Christian, he was educated in Switzerland and France, in 1842 became secretary to Boghos Bey, Egyptian minister of commerce and foreign affairs, later rose to be bey, and was sent on important diplomatic missions. Under Said Pasha he was in charge of the transport service through Egypt to India, and built the railway across the desert from Cairo to Suez. After the accession of Ismail Pasha, who at first strongly relied upon him, he was Egypt's first minister of public works, and from 1866 minister of foreign affairs. He successfully concluded at Constantinople and Paris the negotiations toward the construction of the Suez Canal, obtained for Ismail the title of Khedive, and strove to introduce European culture and methods of administration. At that time in Egypt the consulates of 17 various powers administered as many different codes of law, and to these courts alone the subjects of the said powers were amenable. Nubar prevailed upon the powers to allow the organization of international courts with a uniform code, perhaps his greatest achievement. He was dismissed in 1874, but on demand of the powers was at the head of the ministry in 1878-9, directing the financial reforms. In 1884-8 and 1894-5 he was again premier. He was very adaptable, not to say pliant, and readily became the administrator of a British policy of which he did not approve.

**Nubia**, *nū'bī-ā*, Africa, a comparatively modern name for a large region, formerly a portion of Ethiopia, and extending on both sides of the Nile from Egypt to Abyssinia; touching the Red Sea on the east and the desert on the west. Nubia proper, or Lower Nubia, extends from Assuan on the Egyptian frontier to Dongola; beyond that is Upper Nubia. But of late the name of Egyptian Sudan, properly applicable to a section of Upper Nubia, has come to be used for Nubia in its widest sense, together with the once Egyptian territory actually in the Sudan, and the equatorial provinces. The great Nubian Desert lies east of the Nile, opposite the great west bend of the river. See **EGYPT**; **SUDAN**.

**Nuble**, *ñoob'lā*, Chile, an inland province; bounded on the north by Linares, on the east by Argentina, on the south and west by Concepcion; area, 3,556 square miles. It is an agricultural region in which the chief product is wheat, and considerable attention is given to raising cattle. Capital, Chillan.

**Nucleoproteids**, products of the compounding of nuclein with proteids. They are compounded in varying proportion, but nearly all cell-nuclei contain them. On digestion with gastric juice an insoluble residue of nuclein is left by nucleoproteids.

**Nuddea**, *nūd'ē-ā*. See **NADIA**.

**Nudibranchia'ta**, one of the two primary divisions (orders or sub-orders) of the opisthobranchiate gastropods. The name is in allusion to the absence of the primary gills or ctenidia, which in mollusks occur typically within the mantle cavity, and the functional substitution for them of external processes or cerata which perforate the mantle when the latter is present. The cerata differ greatly in form and arrangement, and their peculiarities characterize the dif-

ferent families. They may be retractile or not; armed with stinging cells or without them; simple, pronged or arborescently branched, in the latter case usually penetrated by portions of the complexly ramifying liver. In their arrangement they may form dorsal or lateral rows, or a circle about the anus. Frequently they are most beautifully colored, and in many cases closely resemble the object on which the animal lives. The young are provided with a nautiloid shell, which is lost early in life, leaving the adult devoid of this protection. A mantle may or may not persist, and the integuments are frequently filled with calcareous spicules. On the head are found a pair of minute sessile eyes, and a pair of often retractile tentacles, which are olfactory in function and are known as rhinophores; in addition to which there may be a second pair of tactile tentacles. The mouth is provided with a radula and sometimes with jaws. Because of the usually elongated form of the body and their strictly marine habit, the nudibranchs are known popularly as "sea-slugs." With the exception of a few free-swimming, pelagic, and parasitic forms, the vast majority of the species belong to the littoral zone, where they creep upon algae, hydroids, polyzoans, and similar organisms, which afford them concealment and a place to attach the gelatinous capsules in which the eggs are deposited, besides furnishing the animal or vegetable food on which the particular species subsists. Most, if not all, of them are hermaphrodites. Upward of 1,000 species have been described and arranged in 17 families. On the Atlantic coast of the United States 21 genera and 33 species occur in the region north of Cape Hatteras.

**Nueces**, nwā'sēs, a river in Texas, has its rise in a ridge of low mountains in Edwards County, flows south into Dimmit County, then east, northeast, and southeast into Corpus Christi Bay. It formerly marked the boundary of the province of Texas in Mexico. It is about 400 miles long and navigable only a short distance from the Gulf.

**Nueva Cáceres**, nwā'vā kā'thā-rēs, Philippines, formerly Naga, a pueblo and capital of the province of Ambos Camarines, situated in the southern part of the province on the Naga River at the head of navigation for large vessels, 10 miles inland from San Miguel Bay. It is a port of entry and an important road centre, and has an excellent trade. It is well built, contains a government house, a cathedral and episcopal palace, a seminary, hospital, parochial school, and a normal school for girls. It was at one time the seat of the episcopal see of the Philippines. Pop. 11,550.

**Nueva Ecija**, ā'thē-hah, Philippines, a province of central Luzon, having a coast line of 23 miles on the Pacific, and bounded on the north by Pangasinán and Nueva Vizcaya, and on the south by Infanta and Bulacán. The surface is mostly low, but is broken in the northeast and south by foothills of the Cordilleras; the Grande de La Pampanga River crosses the province from north to south, the Canarén tributary of the Agno follows the northwestern boundary, the Pampanga Chico, the southwestern; many smaller rivers are tributary to these. The soil is very fertile, the larger rivers frequently overflowing and fertilizing the fields with their deposits. Rice is raised in the

southern and central portions; other important products are corn, tobacco, sugar, and papay. The chief industry is agriculture; there are some manufactures for home consumption only; sugar is in some cases manufactured and refined on the sugar plantations. Cattle are raised in the central part of the province. A road parallels the entire course of the Grande de la Pampanga River; there are numerous other roads, and a large boat traffic along the Pampanga and its tributaries. Civil government was established in Nueva Ecija in June 1901, and at the end of that year the governor reported that the province was "free from insurrectionary movement." Pop. 156,610, mostly Tagalogs.

**Nueva Esparta**, ās-pār'tā, Venezuela, a state composed of islands off the northwest coast of the republic. Margarita is the largest island of the group. Nueva Esparta was a part of the state of Guzman Blanco until 1901, when it became a separate state.

**Nueva Leon**, lā-ōn' ("New Leon"), Mexico, a state in the northeastern part, bordering on the United States; area, 23,592 square miles. It is crossed by low mountain ranges, but has many fertile valleys, in which the chief products are cotton, rice, and fruits. The chief minerals which are mined are gold, silver, salt, and lead. The capital is Monterrey (q.v.). Pop. about 330,000.

**Nueva San Salvador**, sän sāl-vā-dör', Salvador, Central America, city in a mountainous region a little northwest of the centre of Salvador. The chief occupation is mining. Pop. about 13,000. See SALVADOR.

**Nueva Vizcaya**, vēth-kā'yā, Philippines, a province of the island of Luzon, situated south of the centre of Northern Luzon, bounded on the east by the province of Isabela, and on the west by Pangasinán and Benguet; area, 1,075 square miles. The surface of the province is uneven, being broken by the foothills of the Sierra Madre, the Cordillera Central and the Caraballo range. The Magat tributary of the Grande de Cagayán River crosses the province from northwest to southeast, and there are numerous smaller rivers and streams. The only crop raised to any extent is rice; sugar, chocolate, and tobacco are also raised, but not in sufficient quantities to supply the inhabitants of the province. Several kinds of building stones, granite, sandstone, etc., are found in the mountains, but quarried only to a small extent; there are also valuable forests containing resin and gum trees, but these products are not gathered on account of the difficulty of transportation. A few simple fabrics are woven for domestic use. The main highway of Luzon from Manila to Aparri passes through this province, but there is but little traffic on account of the difficulty of reaching the interior. Civil government was established for the province in January 1902; and a special form of municipal government organized for a few of the larger towns, which is to be extended to other towns when they are prepared for it. Pop. 60,630, mostly non-Christian tribes.

**Nuevitas**, nwā-vē'tās, Cuba, seaport in the province of Puerto Principe, in the northeast part of the province, on the coast, and on the railroad which extends 39 miles to Puerto Principe (q.v.). It has an excellent harbor and a large trade with other seaports of Cuba, the



## NUEVO LAREDO — NULLIFICATION

West Indies, and the United States. Pop. about 7,000.

**Nuevo Laredo**, nwā'vō lā-rā'dō, Mexico, town in the state of Nuevo Leon; on the Rio Grande, and on the Mexican National Railroad. It is opposite Laredo, Texas, and about 160 miles north by west of Monterey. Pop. 2,500.

**Nuisance**, in law, a term used to denote whatever is a serious annoyance to one's neighbors, or in a general sense to the public at large, in the exercise of their rights of property. Nuisances are of two kinds—public or common, and private. Public nuisances are: Annoyances in the highways, bridges, and public rivers, by rendering the same difficult or dangerous to pass, either by actual obstructions or by want of repair; injurious and offensive trades and manufactures, which, when hurtful to individuals, are actionable, and when detrimental to public health or convenience, punishable by public prosecution, and subject to fine according to the nature of the offense; keeping hogs in a city; disorderly houses, unlicensed plays, gaming houses, and brothels; lotteries; making and selling fireworks in unlicensed places. The storing of petroleum is also strictly regulated. Suffering any mischievous dog to go loose, to the danger of neighbors or passengers, is an indictable offense, and an action for damages will also lie against the owner; but it will not lie unless the owner has had notice of the dog having bitten somebody at least once before. In general, the owner of any vicious animal seems bound to secure it at all events, and is liable for damages to a party subsequently injured if the mode he has adopted to secure it proves to be insufficient. A private nuisance may be defined as an injury or annoyance to the person or property of an individual. If a person builds a house so near to that of his neighbor that the roof of the new building overhangs that of the other, and throws the water on it, this is a private nuisance, for which an action will lie. And if a house is built so near that it will obstruct the light and windows of another, the owner of the new house subjects himself to an action. But depriving one of a mere matter of pleasure—as of a fine prospect, this, as it abridges nothing really necessary or convenient, is not an injury for which there is legal remedy. To keep hogs near one's house, or to carry on any offensive trade—as a tanner, tallow-melter, soap-boiler, or the like—are all nuisances for which an individual has remedy by action. So also is it a nuisance if life be made uncomfortable by the apprehension of danger, or by employing a steam engine, which produces a continual noise and vibration in the apartments of a neighbor. Besides the remedy by action, injured parties may, in a clear case, take the law into their own hands, and remove or abate the nuisance, but it is never advisable to take this course. In all municipal codes there are elaborate provisions with reference to sewers and drains, the disposal of sewage, scavenging and cleansing, water supply, cellar dwellings, and lodging houses, the prevention, abatement, etc., of nuisances, offensive trades, unsound meat, infectious diseases, and hospitals, mortuaries, highways and streets, lighting of streets, public pleasure grounds, markets, and slaughter houses, police regulations, prosecution of offenses, alteration of areas, etc. The overcrowding of houses

may be stopped. Provisions are also made to prevent the spread of diseases in times of epidemics, and to prevent common lodging houses from being kept in an unclean state. The inspector of nuisances or the medical officer of health has at all times power to inspect any animal, carcass, meat, poultry, game, fish, fruit, vegetables, corn, bread, or flour, and if found unfit for food, or diseased or unsound, they may be carried away and destroyed, and the owner or dealer fined. The local authority may order house proprietors to provide proper water closets, to cleanse gutters and cesspools, and to remove any pool, ditch, drain, urinal, or privy injurious to health.

**Nukha**, noo'khā, Russia, town in Transcaucasia, about 120 miles east by south of Tiflis and 150 miles northwest of Baku. It is near oil fields and is the industrial and commercial centre of a silk-producing region. The inhabitants are mostly Armenians and Russians. Pop. about 20,000.

**Nukualofa**, noo-koo-ā-lō'fā, Friendly Islands, the capital of Tonga, the largest island of the group. See FRIENDLY ISLANDS

**Nüll**, nüil, Edward van der, Austrian architect: b. Vienna 9 Jan. 1812; d. there 3 April 1868. He was professor of architecture and ornamentation in the Vienna Academy, and a prominent practising architect. Most of his designs were executed with August von Siccardsburg. These include the Larisch palace and the Opera, at Vienna. Nüll's style was largely Renaissance, inclining to late Renaissance and rococo, and he exercised a decided influence on the architectural development of Vienna.

**Nullification**, in American history, a political doctrine first suggested in the Kentucky Resolutions of 1798. Its fundamental principle was accepted by the Hartford Convention of 1814, but it was not until 1832 that the theory was fully developed by the master mind of Calhoun, and acted on by South Carolina in its famous Nullification Ordinance of 24 November of that year. The Federal Constitution recognized both the Union and the States as bearers of power, but did not clearly apportion it between them, nor clearly determine in cases of disputed claims which was the final arbiter. The nation possessed only delegated authority, while to the States remained the residuary powers. Calhoun in elaborating this doctrine claimed that historically the States came into being first, and were the creators of the Union, the grantors of power to their agent, the Federal government. It followed, therefore, as a natural consequence, that the final judge of the amount of power granted could not lie with the created—the agent—but must remain with the States as the creator. Also at this point the question arose in regard to the remedy should the agent of the States exceed the authority delegated, and pass laws that were contrary to the reserved rights of the partners in the Union. The fundamental basis then of nullification as Calhoun developed it was State Sovereignty (q.v.); and, in cases where the Nation was encroaching on the reserved rights of the States, he found in nullification a peaceable remedy. Secession and revolution were thus to be made unnecessary. The Union was as perfect after as before nullification. All rights and duties of the States and the Union remained unchanged except in regard to

## NULLIPORE

the one nullified and therefore void law. Should any of the co-States desire to test the matter a constitutional convention might be called, and the question be settled by process of amending the constitution; but till overruled in this way the law was void in the nullifying State.

The cause of nullification is bound up in a compound of the protective tariff and sectional slavery. The former offered the immediate occasion for its promulgation, while the conditions that made protection popular in one section, and hated in the other, were found in the latter. As late as 1816 the South was not radically opposed to a protective tariff. But under the slave system manufactures and commerce did not develop. The South therefore could not profit by the protective system, and gradually developed a strong opposition to its continuance. By 1828, under the teaching of President Thos. Cooper, of the University of South Carolina, public opinion in that State had come to hold that the producer and not the consumer paid the tariff duty. It was also noted that about three fourths in value of all exports from the United States consisted of the products of the South, cotton, rice, tobacco, etc. Therefore, in harmony with Cooper's teaching, the South paid approximately three fourths of the government revenues derived from imported goods. Hence the demand for lower duties grew apace. But instead of lower rates the tariffs of 1824 and 1828 raised them. The tariff of 1828—"the tariff of abominations"—aroused Calhoun to seek a remedy. In that year he set forth his nullification theory tentatively, but did not press for action under it. By 1832 the National debt having been extinguished, the South at once began to demand a lower tariff, insisting that the extinction of the public debt removed all excuse for the longer continuance of high duties—of protection. Instead, however, of revising the tariff in 1832 in such a way as to reduce it to a revenue standard, the duties in the new law were placed on a protective basis, and that principle affirmed to be adopted as a permanent one. In South Carolina, for some years, a struggle between the nullifiers and the anti-nullifiers to control the legislature had been in progress. The tariff act of 1832 for the first time gave the necessary two thirds majority to the nullifiers, and on 24 Oct. 1832 the senate by a vote of 30 to 13, and the house by 99 to 25 resolved to call a convention to meet 19 November. On 24 November the convention voted 136 to 26 to declare the tariff acts of 1828 and 1832 null and void, because beyond the powers delegated to the United States. The convention also authorized the legislature to pass all laws necessary to enforce the ordinance of nullification. Laws were accordingly passed to prevent the collection of the tariff within the State, to give to the governor the power to call out the State militia, and to give the State courts full control of all cases involved under the tariff laws.

President Jackson in his annual message of December 1832 barely noticed this nullification action, but in his celebrated Proclamation of 10 Dec. 1832 he discussed the subject in all its aspects. He denied the possibility of nullification being a peaceable remedy. He asserted the National as opposed to the States Rights interpretation of the Constitution, and concluded with an earnest plea for the Union. He appealed to the

people of South Carolina not to be misled, not to be deceived into thinking that their action could end short of war and treason. He pictured their fate and the fate of the Union should they persist in their policy. In the meantime Congress had taken the matter into consideration. The great Webster-Hayne debate of 1830 had awakened the people to a realization of the issue. Now in February 1833 Calhoun and Webster were pitted against each other in the Senate of the United States, in the greatest constitutional discussion concerning the nature of the Union and the powers of the States that had ever occurred in the American Congress. Webster supported Jackson in his national views, while Calhoun reaffirmed the constitutionality of nullification, as a peaceable remedy, against the usurpation of power by Congress. Webster presented the Supreme Court as the final arbiter in disputed cases. Calhoun claimed that this would be making the agent the judge of his own powers—an impossible principle. The request of the President that he be granted increased powers was now met by the introduction of the so-called Force bill 21 January. The bill, however, made no progress until the introduction of Clay's Compromise Tariff bill 12 February. The two measures then moved forward with equal step. The one gave the President power to collect the revenues in South Carolina, using the whole power of the government for the purpose, if necessary; the other provided for a gradual reduction of the tariff duties, until by 1842 no duty should exceed 20 per cent, a revenue basis. The two measures reached the President at practically the same time—he signed them both 2 March 1833, and on 16 March South Carolina repealed her ordinance of secession. Both parties could thus claim a victory; the administration and its friends, as well as Clay, in that the protective tariff still existed; the nullifiers in the fact that provision was made to reduce the tariff to a revenue basis, thus in fact yielding to South Carolina, at the very moment of adopting the Force bill.

Nullification as a constitutional and peaceful remedy against oppression was never again asserted, but the basis of the theory—the doctrine that the States were sovereign—was not abandoned. In fact it was advocated even more strenuously than before. Instead of nullification in the Union, as a remedy, the doctrine of secession—a separation from the Union—gradually became the accepted principle of the States Rights school of statesmen. The advocates of the latter view held that to nullify a law and remain a member of the Nation was absurd; but affirmed that in case of a breach in the compact to withdraw from the Union was a constitutional right that flowed naturally from the character of the Union. Consult: Von Holst, 'Constitutional History of the United States,' Vol. I.; Powell, 'Nullification and Secession in the United States'; Niles, 'Register' (Vol. 43); Richardson, 'Messages; Debates in Congress' (1832-3); Calhoun, 'Works'; Webster, 'Works,' Vol. III.; Houston, 'A Critical Study of Nullification in South Carolina.'

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**Nullipore**, a name given to certain more or less massive sea-weeds of the family *Rhodo-*

*phycea*, common on rocky shores in warm climates, and especially about coral islands, where they serve to protect the corals somewhat against the beating of the waves. From secreting lime on their surface, and hence resembling coral, they were formerly supposed to be a kind of zoophytes. Some small species occur on the northern Atlantic coasts.

**Numa Pompilius**, nū'ma pom-pil'i-ūs, 2d king of Rome, belonging to the legendary period of Roman annals. According to ancient accounts he was from Cures, in the land of the Sabines, and was distinguished for wisdom and piety. He was elected king after the year's interregnum following the death of Romulus. His lengthy and quiet reign he devoted to the adequate establishment of religion; and to him the Romans ascribed their whole system of worship. He also founded the temple of Janus, which during his rule remained closed. The sacred books of Numa, containing the prescribed manner of observance for the rites and ceremonies of religion, were said to have been entombed, and to have been discovered in 181 B.C. This story is now regarded as a forgery.

**Numantia**, nū-mān'shī-a, Spain, an ancient town, situated on the Douro, near the place now called Soria in Old Castile. It is famous for its resistance to the Roman power. While the neighboring places yielded to the Romance the Numantians were firm in refusing submission. Large forces under the prætor Pompeius Aulus (137 B.C.) and the consul Hostilius Mancinus were repulsed. Scipio Africanus, the younger, with an army of 60,000 was sent to subdue them. He surrounded the town and famine compelled them to yield after a siege of 14 months. The conqueror destroyed the town, 133 B.C.

**Numbering Machine**, in printing, a machine for impressing consecutive numbers on account or record books, coupons, railway certificates, bank-notes, railway tickets, etc. The invention is that of Blaise Pascal (1650), and consists of disks or wheels decimally numbered on their peripheries, the whole mounted on one axle upon which they turn freely, acting upon each other in serial order. The first wheel of the series containing the units is moved one figure between each impact, and when the units are exhausted the tens come into action, and act in coincidence with the units, which continue their action.

**Numbers, Book of**, the fourth book of the Pentateuch, named in the Hebrew Bible 'The Wilderness,' from a word which appears in the first verse. The English title is a rendering of the Septuagint designation, which refers to the "numberings" of the people narrated in chapter i. 26. As the book opens at Sinai, like Leviticus, so it contains a continuation of the enactments given in that book. It is also connected with Deuteronomy, which takes up the narrative at the plains of Moab, the point in the people's wanderings at which Numbers ends.

**Contents of Numbers.**—The book may be divided into three parts, each of which places the scene of its incidents in a different locality. (1) The scene is Sinai in the first part. The desert march is to begin by a numbering of the people. A separate census of the Levites is taken, as also of the first-born males. This is followed by regulations for the lepers' banishment from the camp; the law of restitution; the

"waters of jealousy"; the law of the Nazarite; the form of priestly blessing. The offerings made by the princes at the dedication of the tabernacle are then enumerated. The Levites are set apart for their sacred office; the Passover observed by all ceremonially fitted for the observance; the guidance of the pillar of cloud described. (2) The second part relates the incidents of the journey from Sinai to the plains of Moab, and extends from the 2d to the 40th year after the Exodus. It is made up of the following disjected episodes: the murmurings at Taberah and Kibroth-hataavah; the institution of the seventy elders; the spying out of the land; the revolt of Miriam and Aaron; the consequent leprosy of Miriam; the stoning of the sabbath-breaker; the judgment of Korah and his company; the enactment of certain ceremonial laws. These events took place at Kadesh. The narrative proceeds with the journey from Kadesh to Edom, relating the victories over Sihon and Og and from Edom to the plains of Moab, relating the death of Miriam; the faithfulness of Moses and Aaron at Meribah; the death of Aaron at Mount Hor; and the visitation of fiery serpents. (3) The third part narrates the incidents that occurred in the plains of Moab; Balaam's prophecy; the idolatry at Shittim; the second numbering of the people; the appointment of Joshua to succeed Moses; the partition of the Promised Land; appointment of Levitical cities and cities of refuge; encounter with the Midianites.

**Literary Characteristics.**—These recall Exodus in its chronological dislocation and mixture of narrative and legislation. The Book of Numbers contains some remarkable fragments of old Hebrew poetry. It is brief in comparison with the length of time covered, there being little record of about thirty-eight years spent in the wilderness. The beginning of the narrative is a pretty full account of the first fourteen months of the journey, this completeness of detail is again resumed in the record of the closing year.

Consult: Driver, 'Introduction to the Old Testament'; Addis, 'Documents of the Hexateuch' (1898); Carpenter and Battersley, 'The Hexateuch' (1900); Briggs, 'The Hexateuch.'

**Numbers, Theory of**, in its elementary part, is that branch of mathematics which deals with the properties of integers. The scope of the whole subject can best be indicated after an explanation of the idea of a *modular system* of numbers, which is fundamental in it. An adequate treatment of certain problems relating to integers requires that the system of integers (including zero) under consideration be enlarged by the introduction of certain other numbers, and that the system, so enlarged, shall retain the fundamental properties of the original system. The latter is such that it contains the difference (and hence the sum) of any two of its numbers, and this property is selected as fundamental. A system of numbers which has this property is called a modular system; it always contains (1) the number zero, (2) the negative of each of its numbers, (3) an infinite (see ASSEMBLAGES, GENERAL THEORY OF) number of numbers. In general it is possible to select a certain set of numbers of the system, called the basis of the system, as say,  $m_1, m_2, \dots, m_n$ , called the elements of the basis, and to express

## NUMBERS, THEORY OF

every number of the system in the form  $x_1m_1 + x_2m_2 + \dots + x_nm_n$ , where the  $x$ 's are integers. The theory of numbers is the study of certain modular systems.

### DIVISIBILITY OF INTEGERS.

The set of integers, which is a very simple modular system having one element, unity, in its basis, has the additional property that it contains the product of every two of its numbers; and two large classes of relations of integers are called *additive* and *multiplicative* since they depend mainly upon ideas of addition and multiplication respectively. The introductory part of the subject deals mainly with the latter relations. For the sake of brevity there will be assumed from Arithmetic and Algebra (see ALGEBRA) the commutative and associative laws for addition, the commutative, associative and distributive laws for multiplication, the meanings of divisor, or factor, common divisor, greatest common divisor (G. C. D.), multiple, common multiple, least common multiple (L. C. M.),  $\lfloor a \rfloor$ , function, and the processes for finding the G. C. D. and L. C. M. of two integers.

**Factorization of Numbers.**—An important and at times an exceedingly difficult problem is that of finding all divisors of a number. Certain numbers have no divisors except themselves and unity. These are called *prime*. (Two numbers which have no common divisor except unity are called *relatively prime*.) All divisors of a number may easily be found if all of its prime divisors are determined, but no satisfactory method has been devised for such determination. Nevertheless certain principles are clearly understood.

Consider now one modular system consisting of all positive and negative multiples of an integer  $a$ , and another consisting of all such multiples of another integer  $b$ . It may be shown that (1) *the set of numbers consisting of all of the numbers of these two systems and also of the sums of all pairs of them is a modular system consisting of the positive and negative multiples of  $d$ , the G. C. D. of  $a$  and  $b$* . For if any two integers of the first system be  $ax_1, ax_2$ , and if any two of the second system be  $by_1$  and  $by_2$ , then any two of the third system can be represented by  $ax_1 + by_1$  and  $ax_2 + by_2$ . The difference of these,  $a(x_1 - x_2) + b(y_1 - y_2)$ , is in the third system, since it is the sum of  $a(x_1 - x_2)$  and  $b(y_1 - y_2)$ , which are in the first and second systems, respectively. The third system is, then, a modular system, and consists of all multiples of its smallest number,  $n$ , say. Since  $a$  and  $b$  are in the third system,  $n$  must be a common divisor of  $a$  and  $b$ . But every number of the system, being of the form  $ax + by$ , is divisible by  $d$ . Hence  $n = d$ .

As an example, let  $a = 6, b = 8$ , whence  $d = 2$ . The three systems are respectively  
 $\dots, -24, -18, -12, -6, 0, 6, 12, 18, 24, \dots$   
 $\dots, -32, -24, -16, -8, 0, 8, 16, 24, 32, \dots$   
 $\dots, -8, -6, -4, -2, 0, 2, 4, 6, 8, \dots$

**Corollary (2).** *If two integers  $a, b$ , have their G. C. D. equal to  $d$ , there exist integers  $x, y$ , such that  $ax + by = d$ . (This is true even if  $d = 1$ .)*

**Example 1.**  $a = 6, b = 8, d = 2; 6 \cdot 3 + 8(-2) = 2$ .

**Example 2.**  $a = 5, b = 6, d = 1; 5 \cdot 5 + 6(-4) = 1$ .

The following result is used repeatedly in later arguments:

**Theorem (3).** *If of three numbers  $a, b, c$ , two of them,  $a$  and  $b$ , are relatively prime, then every common divisor of  $ac$  and  $b$  is a common divisor of  $b$  and  $c$ . For let  $ac$  and  $b$  have a common divisor  $d$ . Since  $a$  and  $b$  are relatively prime there exist numbers  $x$  and  $y$ , such that  $ax + by = 1$ . Then  $acx + bcy = c$ . But  $d$  is a divisor of  $acx$  and  $bcy$ , and hence of  $c$ . It is therefore a common divisor of  $b$  and  $c$ .*

**Corollary (4).** *If  $a$  and  $b$ , and also  $b$  and  $c$ , are relatively prime, so are  $ac$  and  $b$ .*

A theorem of fundamental importance in relation to the factorization of numbers may now be proved.

**Theorem (5).** *A positive integer can, in one and only one way, be represented as a product of prime factors.*

If possible, let an integer  $n$  be expressed by two different products of prime factors.  $p_1 p_2 \dots p_k$  and  $q_1 q_2 \dots q_l$ , where in each case the order of the factors is such that a smaller factor never follows a larger. Then  $p_1 p_2 \dots p_k = q_1 q_2 \dots q_l$ . If any factor, as  $p_2$ , were not present in the second product it could not be a divisor of that product, nor of  $n$  (see 4). A continuation of this argument yields a *reductio ad absurdum*.

For large numbers the problem of factorization is very difficult, but for small ones it is comparatively easy. For since the smallest prime factor of a number  $n$ , not itself a prime, cannot exceed  $\sqrt{n}$ , it is necessary to test only prime factors up to  $\sqrt{n}$ .

**Distribution of Primes.**—The proof that the number of primes is infinite was given by Euclid, and is singularly brief. The assumption that there is a largest prime,  $p$ , is shown to be incorrect by the consideration of the number  $1 + p$ , which, not being divisible by any number less than  $(p + 1)$ , must either be divisible by a prime greater than  $p$  or be a prime itself.

The law of distribution of primes has been carefully studied, but the investigations cannot be presented here, the law being a very obscure one. Two special results are of some interest. It has been shown that between any number  $n (> 1)$  and its double,  $2n$ , there is at least one prime, and also that any number,  $m$ , of consecutive numbers can be found, no one of which will be prime.

**Number and Sum of Divisors of a Number.**

—If the number 55125 be expressed by means of its prime factors the result is  $3^2 5^3 7^2$ . Now every divisor of this number must be a product of powers of 3, 5, and 7. In fact, all of these divisors are terms in the expansion of the product  $(1 + 3 + 3^2)(1 + 5 + 5^2 + 5^3)(1 + 7 + 7^2)$ . This expansion contains  $(2 + 1)(3 + 1)(2 + 1) = 36$  terms. Hence the number of divisors of 55125 is 36. Again, the product mentioned is equal to the sum of these 36 divisors.

Also  $(1 + 3 + 3^2) = \frac{3^3 - 1}{3 - 1}$  (see ALGEBRA, Geometrical Progression). Hence the sum of all

divisors of 55125 is  $\frac{3^3 - 1}{3 - 1} \frac{5^4 - 1}{5 - 1} \frac{7^3 - 1}{7 - 1}$ . In

general, if  $n = p_1^{a_1} p_2^{a_2} \dots p_k^{a_k}$ , the  $p$ 's being

primes, (6) the number of divisors of  $n$  is  $(a_1 + 1)(a_2 + 1) \dots (a_k + 1)$ , and (7) their sum is

$$\frac{p_1^{a_1+1} - 1}{p_1 - 1} + \frac{p_2^{a_2+1} - 1}{p_2 - 1} + \dots + \frac{p_k^{a_k+1} - 1}{p_k - 1}.$$

*Number of Numbers less than a Given Number and Relatively Prime to It.*—The number  $10125 = 3^4 5^3$ . The numbers less than 10125 and relatively prime to it are those which are not divisible by 3 or by 5. From the first 10125 numbers all multiples of 3, and all multiples of 5, should be omitted. There are  $\frac{1}{3} \times 10125$  multiples of 3, and  $\frac{1}{5} \times 10125$  multiples of 5, but some of these, the  $\frac{1}{15} \times 10125$  multiples of 15, are multiples of both 3 and 5. Hence the number of numbers relatively prime to and less than 10125 is  $(10125 - \frac{1}{3} \times 10125 - \frac{1}{5} \times 10125 + \frac{1}{15} \times 10125) = 10125(1 - \frac{1}{3})(1 - \frac{1}{5})$ , since the multiples of 15 should not be

removed twice. In general, if  $n = p_1^{a_1} p_2^{a_2} \dots p_k^{a_k}$  it may be shown that (8) the corresponding number, which is always denoted by  $\phi(n)$ , is  $n(1 - \frac{1}{p_1})(1 - \frac{1}{p_2}) \dots (1 - \frac{1}{p_k})$ . For example

$\phi(7) = 6$ ,  $\phi(10) = 4$ ,  $\phi(p) = (p - 1)$ . This important function  $\phi(n)$  has the notable properties: (1) If  $n$  and  $n_1$  are relatively prime  $\phi(nn_1) = \phi(n)\phi(n_1)$ ; (2) If  $d_1, d_2, d_3, \dots$  are all of the divisors of  $n$ ,  $\phi(d_1) + \phi(d_2) + \phi(d_3) + \dots = n$ .

#### THEORY OF CONGRUENCES.

Consider the modular system consisting of all positive and negative multiples of a positive integer  $m$ . Then any integer either is in this system or differs from a number of it by a number  $r$ , less than  $m$ . Hence every integer is expressible in the form  $mq + r$ . Integers may then be divided into  $m$  classes, all those in any class having the same remainder when divided by  $m$ . Then the difference between two numbers of the same class is divisible by  $m$ , and these two numbers are said to be *congruent with respect to the modulus  $m$* . If  $n_1$  and  $n_2$  are in the same class, this relation is written  $n_1 \equiv n_2 \pmod{m}$ , a notation which is due to Gauss. The statement is called a *congruence*. Thus the modulus being 3, the numbers 7 and 16 belong to the same class, since each gives the remainder 1 when divided by 3. Then  $7 \equiv 16 \pmod{3}$ , or in other words, the difference between 7 and 16 is a multiple of 3.

The following are fundamental properties of congruences, the modulus, when omitted, being  $m$ :

- (6) If  $a \equiv b$ , and  $a \equiv c$ , then  $b \equiv c$ .  
 If  $a \equiv b$ , and  $c \equiv d$ , then  $a + c \equiv b + d$ ,  
 and  $ac \equiv bd$ .  
 If  $a \equiv b$ , then  $ca \equiv cb$ .  
 If  $ca \equiv cb$ , and if  $d$  is the G. C. D. of  $c$  and  $m$ , then  $a \equiv b \pmod{\frac{m}{d}}$ .

Between the methods used and the results obtained in the theory of congruences and the methods and results in the apparently unrelated field of the theory of equations (see EQUATIONS, GENERAL THEORY OF), there is a parallel so striking that one acquainted with the latter can promptly select, and even solve, a great many

of the most important problems relating to the former. Thus congruences may state relations between known quantities only, or between known and unknown quantities, in the latter case suggesting the problem of finding possible values of the unknown quantities. Congruences of the latter sort may be classified either according to the number of the unknown quantities or according to the degrees of the expressions with respect to these unknown quantities. Thus if  $f(x, y, z, \dots)$  is an algebraic expression containing several unknown numbers  $x, y, z, \dots$ , as well as known numbers, the standard problem is: *To determine integral values for  $x, y, z, \dots$  such that the congruence  $f(x, y, z, \dots) \equiv 0 \pmod{m}$ , shall be true.* A set of values of the sort required constitutes a *solution* of the congruence. If there is only one unknown number in the congruence, any value of that number for which the congruence is true is called a *root* of the congruence. Two roots which are congruent are regarded as the same root.

Consider now congruences which contain only one unknown number  $x$ , and in particular, congruences of the form  $f(x) = a_0 x^n + a_1 x^{n-1} + \dots + a_n \equiv 0 \pmod{m}$  where  $a_0, a_1, \dots, a_n$  are integers,  $a_0$  being relatively prime to  $m$ . Then by methods parallel to those of the theory of equations it may be proved that when the *modulus is prime* (1) the congruence has not more than  $n$  different roots; (2) if  $r$  is any integer, the remainder free from  $x$  obtained when  $f(x)$  is divided by  $(x - r)$  is congruent to  $f(r) \pmod{m}$ ; (3) if  $r$  is a root of the given congruence, the remainder obtained by dividing  $f(x)$  by  $(x - r)$  is congruent to zero  $\pmod{m}$ .

*Linear Congruences.*—The general congruence of the first degree in  $x$ , namely,  $a_0 x + a_1 \equiv 0 \pmod{m}$ ,  $a_0$  being relatively prime to  $m$ , has just one root. For of the  $m$  numbers  $a_0, 2a_0, 3a_0, \dots, (m - 1)a_0, ma_0$ , no two differ by a multiple of  $m$  (see 9). Hence just one of them belongs to each of the  $m$  classes of numbers. If  $ka_0$  and  $-a_1$  belong to the same class, then  $\{ka_0 - (-a_1)\}$  or  $ka_0 + a_1$  is a multiple of  $m$ . Hence  $a_0 k + a_1 \equiv 0 \pmod{m}$ ; and  $k$  is a root of the congruence.

*Corollary:* The congruence  $a_0 x \equiv 1 \pmod{m}$  ( $a_0$  relatively prime to  $m$ ) has just one root,  $\bar{a}_0$ , say.

In this case the numbers  $a_0, \bar{a}_0$  are called *associate numbers*.

If in the congruence  $a_0 x + a_1 \equiv 0 \pmod{m}$ ,  $a_0$  and  $m$  have as G. C. D. the number  $d$ , the congruence has no roots unless  $a_1$  is divisible by  $d$ , in which case it has  $d$  of them. For suppose that  $a_0 = a'_0 d$ ,  $a_1 = a'_1 d$ ,  $m = m' d$ . Then if

$$a_0 x + a_1 \text{ is divisible by } m, \frac{a_0 x + a_1}{d} \text{ or } a'_0 x + a'_1$$

is divisible by  $m'$ , and conversely. But the congruence  $a'_0 x + a'_1 \equiv 0 \pmod{m'}$  is of the sort considered just above, and the numbers which satisfy it are all congruent  $\pmod{m'}$ . It has then only one root, say  $k$ ,  $\pmod{m'}$ . All numbers which satisfy the latter congruence are roots of the former, but they are not all congruent  $\pmod{m}$ . On the contrary, with respect to the modulus  $m$ , there are  $d$  distinct sets, and the original congruence has  $d$  roots,  $k, k + m', k + 2m', \dots, k + m'(d - 1)$ .

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The last result furnishes an interesting example of the failure of the parallel between the theory of congruences and the theory of equations. Of these there are not a few. They generally occur when the modulus is not prime. Another interesting example is the possibility of solving several simultaneous congruences in one unknown quantity, the moduli of the congruences being different.

**Theorems of Fermat and Wilson.**—Before discussing the various classes of congruences of higher orders it is convenient to exhibit two of the most interesting results of the whole subject. They are the theorems of Fermat and Wilson.

**FERMAT'S THEOREM.** *If  $p$  is any prime number, and any number less than  $p$  and greater than zero, then  $a^{p-1} \equiv 1 \pmod{p}$ .*

Consider the set of numbers  $a, 2a, 3a, \dots, (p-1)a$ . No two of them are congruent  $\pmod{p}$ . Hence they are congruent to different ones of the numbers  $1, 2, 3, \dots, (p-1)$ , though not necessarily in this order. The product of the first set is congruent to the product of the second set, whence  $a^{p-1} [p-1] \equiv [p-1] \pmod{p}$ . Then  $a^{p-1} \equiv 1 \pmod{p}$  since  $[p-1]$  is relatively prime to  $p$  (see §9).

The statement of Wilson's theorem is: *If  $p$  is any prime number,  $[p-1] \equiv -1 \pmod{p}$ .*

Both of these theorems have been so generalized as to apply to the case in which the modulus is not prime.

Fermat's theorem furnishes another instance of the failure of the parallel between the theory of numbers and the theory of equations. For from it we see that the congruence  $x^p \equiv x \pmod{p}$  is satisfied by every number of the system of integers.

**Congruences of Higher Orders.**—The general quadratic congruence may be written  $a_n x^2 + a_1 x + a_0 \equiv 0 \pmod{m}$ . Its solution may be reduced to the solutions of a linear congruence and of a binomial congruence of the form  $x^2 \equiv a \pmod{m}$ . In connection with this congruence the important questions are: (1) What relation must exist between  $a$  and  $m$  in order that the congruence may be solvable? and (2) What are the roots of a congruence of this sort which is known to be solvable? According as the congruence is or is not solvable,  $a$  is said to be a *quadratic residue* or a *quadratic non-residue* of  $m$ .

In regard to the first question it may be noted that if  $(x^2 - a)$  is divisible by  $m$ , it is divisible by every prime factor,  $p$ , of  $m$ . Hence if the congruence is solvable  $a$  must be a *quadratic residue of every prime factor of  $m$* . It may also be proven that the product of two numbers is a quadratic residue if each number is a residue, or if each is a non-residue, but that the product is a non-residue if only one is a residue. Hence it is possible to determine whether  $a$  is a residue of  $m$  if one finds whether each prime factor of  $m$  is a residue of each prime factor of  $m$ . This procedure raises three distinct questions, for  $a$  may have as factors,  $-1, 2$ , or odd primes. It is easy to show that,  $p$  being a prime factor of  $m$ , (1)  $-1$  is a quadratic residue of all primes of the form  $4n+1$  (e. g. 13, 17, 29), but a non-residue of all primes of the form  $(4n+3)$  (e. g. 23); and (2)  $2$  is a residue of all primes of the form  $(8n+1)$  or  $(8n-1)$  (e. g. 17, 23), but a non-residue of all primes of the form  $(8n+3)$  or  $(8n-3)$  (e. g. 11, 29).

To determine whether a given odd prime,  $p$ , is a quadratic residue of another odd prime  $q$ , use is made of the famous Reciprocity Theorem, first proven by Gauss. This theorem states that *if, of two odd primes  $p$  and  $q$ , one is of the form  $(4n+1)$  then each is a quadratic residue of the other, or each is a non-residue of the other; while if both primes are of the form  $(4n+3)$ , one is a residue or non-residue of the other according as the other is a non-residue or residue of the one*. This theorem is the most celebrated one in the theory of numbers; it has been proven in a great variety of ways, Gauss himself having contributed seven distinct proofs. The application of this result and of the two preceding ones is greatly facilitated by the use of what is known as Legendre's Symbol.

**Legendre's Symbol.**—It is found that according as a number  $a$  is or is not a quadratic residue of  $p$ , a certain function of  $a$  and  $p$  is congruent to  $+1$  or  $-1 \pmod{p}$ . Legendre introduced the symbol  $\left(\frac{a}{p}\right)$ , defining it to be  $+1$ ,

or  $-1$ , according as  $a$  is or is not a quadratic residue of  $p$ . The three results stated may be written symbolically:

$$(1) \left(\frac{-1}{p}\right) = (-1)^{\frac{p-1}{2}}; \quad (2) \left(\frac{2}{p}\right) = (-1)^{\frac{p^2-1}{8}};$$

$$(3) \left(\frac{p}{q}\right) \cdot \left(\frac{q}{p}\right) = (-1)^{\frac{p-1}{2} \cdot \frac{q-1}{2}}.$$

The use of the third result may be illustrated by taking  $p = 13, q = 3$ . Then  $\left(\frac{13}{3}\right) \cdot \left(\frac{3}{13}\right) = +1$ .

But two congruent numbers are both residues or both non-residues. Hence, since  $13 \equiv 1 \pmod{3}$ ,

$$3), \left(\frac{13}{3}\right) = \left(\frac{1}{3}\right). \quad \text{Moreover } 1 \text{ is a quadratic res.}$$

idue of every number. Hence  $\left(\frac{1}{3}\right) = +1$ ;

and so  $\left(\frac{3}{13}\right) = +1$ . Accordingly 3 is a quadratic residue of 13.

The difficulties of solving a binomial quadratic congruence which is known to be solvable are relatively slight, and the question will not be considered here.

The theory of congruence of degrees higher than the second is far from complete. Considerable attention has been given to binomial congruences of the form  $a_n x^n + a_0 \equiv 0 \pmod{m}$ . Gauss found that he could not properly state the reciprocity-theorem for the case  $n=4$ , without making a study of the modular system of numbers of the form  $a + b\sqrt{-1}$ ,  $a$  and  $b$  being integers. His results have been generalized and much more general modular systems have been studied. An account of these cannot be given here.

**Other Branches of the Subject.**—The theory of congruences belongs to the multiplicative part of the subject. Another notable branch is the theory of forms, which is essentially additive. In it the standard problem is "Given an expression  $f(x, y, z, \dots)$  in which all of the numbers are integers, to determine whether by a choice



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of integral values for certain unknown quantities the expression can be made to assume a specified integral value." Thus in the case of the quadratic form  $ax^2 + bxy + cy^2$ , the problem is to find whether a specified integer  $m$  can be broken up into three integral parts of the form  $ax^2$ ,  $bxy$ , and  $cy^2$ , and to determine in how many essentially different ways this can be done. The study of the classification of quadratic forms alone requires the use of infinite series (see SERIES) and of other agencies which at first sight seem to be entirely unrelated to the theory of integers. The theory of forms has been studied principally in connection with forms of the second order in any number of unknown quantities  $x, y, z, \dots$ , and forms of the second and third orders in two unknown quantities. One other branch, also of an additive nature, is the theory of partitions of numbers, the partitions of a number being the different ways of expressing it as a sum of a given number of integers. Thus the partitions of 7 into 4 integers are  $1+1+1+4$ ,  $1+1+2+3$ ,  $1+2+2+2$ . The treatment of this subject also requires the aid of the higher Analysis.

*Historical Sketch.*—Historically, the development of the Theory of Numbers falls into two well-defined periods, whose point of division is the year 1801. Until late in the first period the subject was not recognized as constituting a distinct branch of mathematics. The publication in 1801 of Gauss' famous 'Disquisitiones Arithmeticae' firmly established the subject as such a branch, and since that event its development has been rapid and uninterrupted.

Probably the earliest investigators in this subject were Pythagoras (580?–500? B.C.) and his followers, who were familiar with the ideas of odd and even numbers, factors and multiples and primes. By the time of Euclid (about 300 B.C.) the subject included the idea of perfect numbers, that is, those which are equal to the sum of their divisors less than themselves, and of common divisors, the process for finding G. C. D., the proof that the number of primes is infinite. Diophantos (246?–330? A.D.) studied methods of finding rational solutions of indeterminate equations. His work inspired some of the best of the later writers of the first period, among them Bachet de Meziriac (1581–1638 A.D.) and Fermat (1601–55 A.D.), who edited his works. Fermat contributed several very notable results, though without proof. Among them are the theorem already mentioned in the preceding text and the theorem that no integral solutions exist for the equation  $x^n + y^n = z^n$ , if  $n$  is an integer  $> 2$ . Euler (1707–1803 A.D.) proved this last theorem for  $n=3$  and 4, generalized the former theorem, studied the function  $\phi(n)$ , stated the reciprocity-theorem, and initiated the study of quadratic forms. The work of Lagrange (1736–1813 A.D.) and Legendre (1752–1833 A.D.) on quadratic forms closes the first period.

In the work which opened the second period Gauss (1777–1855) systematized the subject in much the same way as that in which Euclid brought order into the subject of geometry. He treated thoroughly the elementary theory of congruences, residues (quadratic and higher), quadratic forms, and founded the modern theory of modular systems by the study of the system of numbers  $a + b\sqrt{-1}$ ,  $a$  and  $b$  being integers.

Of the many workers since Gauss' time it will suffice to mention Dirichlet, who simplified some of Gauss' methods, and made important contributions by the use of infinite series; Kummer, Dedekind, and Kronecker, who considered general modular systems; and Eisenstein, Smith, Hermite, Sylvester, and Minkowski, who contributed largely to the theory of forms.

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**Numerals** (from Latin *numeralis*, from *numerus*, number). In mathematics the word is commonly used to designate characters which represent numbers, as in speaking of the Roman numerals. In very ancient times there were approximately as many systems of numerals as there were languages, and particularly with the higher numerals there were often quite radical modifications from century to century. The numerals most generally used by the mathematicians of classical times were the Greek; of mediæval times, the Roman; of modern times, the Hindu or Arabic. Of these, the first two were but little used in actual computation, the abacus (q.v.) answering for this purpose.

The primitive Greeks, like other early peoples, had little use for large numbers, and so they used separate marks like scores (A. S. *sceran*, to cut, whence *shears*, and to *shore* up a building by a piece of cut timber) or tallies (Fr. *tailler*, to cut, whence *tailor*) on a stick. Even as late as 351 B.C., an inscription at Tralles, in Caria, has ||||| for seven. This plan seems to have been followed by a primitive alphabetic system, the letters being taken in their natural order: A for 1, B for 2, Γ for 3, Δ for 4, and so on until the alphabet was exhausted. For monumental purposes, however, the initial letters of important number words came early into use. These letters were I (either as a primitive single stroke, or from *Ja*, for *jula*), II (Π*έρre*, five) Δ (Δ*έκα*, ten), H (H*εκατόν*, the H being the old breathing, replaced by ' in *ἐκατόν*, hundred), X (Χ*ίλια*, thousand), and M (Μ*ύσια*, ten thousand), together with various ligatures of these letters. These numerals were, in mediæval times, called Herodian, from Herodianus, a grammarian who flourished in the 2d century A.D., who described them. The final form, which generally replaced the Herodian numerals in the 4th century B.C., was alphabetic. It consisted of the accented letters of the alphabet, with three obsolete ones added to bring the number to 27. Of these, the first nine represented the units 1–9, the second nine the tens 10–90, and the third nine the hundreds 100–900. The thousands were represented by the same letters differently accented, although M, Mu, <sup>a</sup>M or αM was generally used for 10,000, <sup>β</sup>M or βM for 20,000, and so on.

The Roman numerals were partly derived, through the Etruscans, from certain Greek letters not adopted in the Italian alphabets. In

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particular,  $\Theta$ , after passing through various modifications, became  $C$ , the final form being, of course, influenced by the word *centum*. The letter  $\Phi$  was adopted for 1,000, and half of it for 500, so that until quite recently  $\text{CD}$  has been printed for  $M$ , and  $D$  for  $D$ . If the symbol be rapidly written it may be made to resemble  $\infty$ , a form not uncommon in the Middle Ages, or the cursive  $M$ , and this final form, as in the case of  $C$ , was determined by a numeral word, *mille*. The primitive form of the Greek *chi*, quite different from the later  $X$ , was adopted arbitrarily for 50, and it is easy to trace, in monumental inscriptions, its transition to the  $L$ . As to the use of  $X$  for 10 and its half,  $V$  or  $\Lambda$  for 5, there is no generally accepted origin, although there have been many ingenious conjectures. In writing large numbers there was great diversity of method, owing to the fact that they were little used in operations, the words being written in full to indicate results. The use of a bar over a numeral to indicate its multiplication by 1,000 was occasionally seen, as in Pliny, but it was not common for the reason that the bar was frequently used to distinguish a numeral from a word. A method which found considerable favor was that of using  $\text{CD}$  for 1,000,  $\text{CCDD}$  for 10,000,  $\text{CCCCDD}$  for 100,000, and so on, with  $D$ ,  $\text{DD}$ ,  $\text{DDD}$ , for 500, 5,000, and 50,000. In the later Middle Ages, forms like  $\text{vjc}$ ,  $\text{ixM}$ ,  $\text{MM}$ ,  $\text{ijjM}$ , and  $\text{Mccccviii}$ , for 600, 9,000, 1,000,000, 3,000, and 1,509 were common. The idea that a character could never be used more than three times in succession is a creation of recent text-book makers, as the use of  $\text{IIII}$  instead of  $\text{IV}$  on clock-faces shows. The number 1900 was formerly written  $\text{MDCCCC}$ , although  $\text{MCM}$  has become common in the present century.

The Arabic or Hindu numerals 1, 2, 3, now in common use, are cursive forms from the primitive symbols  $—$ ,  $=$ ,  $\equiv$ . The numerals 4, 5, 6, 7, 8, 9 seem to have been Bactrian letters arbitrarily adopted in northwestern India as number signs, just as the Etruscans adopted the Greek  $\Theta$ ,  $\Phi$ , and  $X$ . The system first appears in an inscription of the 3d century B.C., in a cave at Nānā Ghāt, in the Bombay presidency. The name *zero* is from the Sanskrit *sunya*, void, through the Arabic *sifr* and the late Greek *ψίφρα*. It appears in Fibonacci (q.v.) as *sephyra*, whence *sephiro*, *sefro*, *zero*, and the French *chiffre*, whence the early Dutch *cijfer* and our *cipher*. The symbol, without which the most essential feature, the place value, of our system is wanting, may have been used in the 6th century A.D., although the earliest known document containing it is an Indian grant of 738. The date of the introduction of the system into Christian Europe is in dispute. The numerals were known to Gerbert (Pope Sylvester II., q.v.) about 1000 A.D., and they may have been known to Boethius (q.v.) 500 years earlier. The Moors in Spain knew them under the name *gobar* (dust), in allusion to their representation upon the dustboard (see *ABACUS*). The first Christian writer fully to appreciate them was Fibonacci (q.v.), who made them known in Italy in 1202 A.D. It was not, however, until after the invention of printing (c. 1450) that their great value could be made widely known. Their extensive use may be said to have begun in Italy in the latter part of the 15th century.

The first printed arithmetic naturally appeared in the centre of the world's commerce of that period, northern Italy (Treviso 1478), and it used these numerals exclusively. In Germany, however, the Hindu characters had not entirely replaced the Roman when the first arithmetics were printed, and hence one of the most popular writers of the first quarter of the 16th century, Köbel, makes extensive use of the latter. Indeed, so familiar had these characters become to the common people of Germany in the 15th century that they were often called German ("Teutsche") numerals, and this name was common as late as 1550. The commercial interests of France not demanding many arithmetics early in the 16th century, the Roman numerals never appeared prominently in their printed books. In England, the Roman numerals played but a small part in the practical text-books, although for college and church accounts they were used until the 17th century. (See *ARITHMETIC, HISTORY OF*.)

The following are some of the forms which the Hindu-Arabic numerals have taken in their evolution from the Bactrian alphabet:

Numerals	1	2	3	4	5	6	7	8	9	0
Bactrian Alphabet	—	=	≡	∞	∞	∞	∞	∞	∞	∞
Nānā Ghāt	—	=	≡	∞	∞	∞	∞	∞	∞	∞
Later Hindu	—	=	≡	∞	∞	∞	∞	∞	∞	∞
10th C. Boethius MS.	—	=	≡	∞	∞	∞	∞	∞	∞	∞
Bernardinus, 11th C.	—	=	≡	∞	∞	∞	∞	∞	∞	∞
Gobar Numerals	—	=	≡	∞	∞	∞	∞	∞	∞	∞
Arab MS., c. 970 A. D.	—	=	≡	∞	∞	∞	∞	∞	∞	∞
MS. c. 1260	—	=	≡	∞	∞	∞	∞	∞	∞	∞

*Bibliography.*—Bombelli, 'L'antica numerazione italica' (Roma 1876); Martin, 'Les signes numériques et l'arithmétique chez les peuples de l'antiquité et du moyen-âge,' in the 'Annali di Matematica pura ed applicata,' Vol. V. (Roma 1864); Bayley, in the 'Journal of the Royal Asiatic Society,' Vol. XV. (N. S.), p. 22; Fazzari, 'Dell' origine delle parole zero e cifra,' in 'Ateneo,' anno I., No. 11 (reprinted, Napoli 1903); Bühler, 'Indische Paläographie,' in the 'Grundriss der Indo-Arischen Philologie und Altertumskunde,' Vol. I., Heft. 11 (Strasburg 1896, p. 73); Treutlein, 'Geschichte unserer Zahlzeichen' (Karlsruhe 1875).

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**Numeration**, the art of expressing in characters any number proposed in words. The chief terms used for this purpose are the names of the digits from one to ten, a hundred, a thousand, a million, etc. The term billion is of uncertain use: in Britain it is a million of millions; in France, America, etc., a thousand millions.

**Numerical Aperture**, a term used in optics; the method by which the illuminating and resolving power of high-power microscopic objectives is calculated. Since it became customary to interpose water, oil, or other fluid between the object and the lens, it is found that a water immersion lens of  $97\frac{1}{2}^\circ$ , and an oil immersion of  $82^\circ$ , give equal results to a dry or air lens of  $180^\circ$ . This obviously depends on the diameter of the back lens of the objective, and this on the refractive index of the medium between lens and object. It is expressed by the formula,  $n \sin u$ , where  $n$  is the refractive index of the medium — air or fluid — and  $u$  the semi-angle of aperture. It is thus found that an oil-lens of  $180^\circ$  has a numerical aperture of 1.52 against 1.00 for  $180^\circ$  in air. This only repre-

## NUMERICAL NOTATION—NUMISMATICS

sents the comparative diameters of the effective pencils, and the relative illumination is, of course, obtained by squaring the numerical apertures to get the comparative areas of the pencils. We thus find that an oil-lens of  $180^\circ$  gives 2.310 the illumination of a dry objective of  $180^\circ$ .

**Numerical Notation**, in music, a modern system of indicating single tones or entire chords by means of numerals. The system is especially used in indicating the range of various instruments. Roman numerals are used in violin music and Arabic figures in compositions. The system was first introduced by G. Weber. See **MUSIC; TONES**.

**Numidia**, nū-mīd'ī-ā, Africa, the ancient Roman name for the region now corresponding roughly with modern Algeria. It was divided among various tribes, but after the second Punic war it was united under Masinissa, and several of its rulers became noted in Roman history, more especially Jugurtha. In 46 B.C. it became a Roman province. Under the Roman emperors Numidia attained a high degree of prosperity, and Christianity was in a flourishing condition here. It was afterward conquered by the Vandals, later by the Arabs, and in modern times by the French.

**Numismatic and Archaeological Society, The American.** See **AMERICAN NUMISMATIC AND ARCHÆOLOGICAL SOCIETY**.

**Numismatics**, the science which treats of coins and coinage and the authorized government issue of money from the archaeological, historical, artistic and economic viewpoint. The word is derived from the Greek *nomisma*, through the form sometimes found in Latin, *numisma*, signifying coin. The name of coins is given to the pieces of metal on which the public authority has impressed different marks to indicate their weight and value, to make them a convenient medium of exchange. The study of coins is regarded as indispensable to archaeology, and to a thorough acquaintance with the fine arts. They indicate the names of provinces and cities, determine their position, and present pictures of many celebrated places. It is from coins that we derive all our knowledge of some of the most celebrated works of ancient art, particularly of ancient statuary. Coins likewise fix the period of events, determine sometimes their character, and enable us to trace the series of kings. They enable us to learn the different metallurgical processes, the different alloys, the mode of gilding and plating practised by the ancients, the metals which they used, their weights and measures, their different modes of reckoning, the names and titles of the various magistrates and princes, and also their portraits; the different divinities, with their attributes and titles, the utensils and the ceremonies of their worship.

**Design and Form.**—The parts of a coin are the two sides. (1) The obverse side, face, or head which contains a portrait of the person at whose command or in whose honor it was struck, or other figures relating to him. This portrait consists either of the head alone or the bust, or of a half or full length figure. (2) The reverse contains mythological, allegorical, or other figures. The words around the border form the legend; those in the middle the inscription. The lower part of the coin, which

is separated by a line from the figures or the inscription, is the basis, and contains subsidiary matter, as the date, the place where the piece was struck and other data. In ancient as in modern times, while the coins of empires or kingdoms were distinguished by the head of the reigning prince, those of republics and free states were distinguished by some symbol, and sometimes these symbols are found along with the head of a reigning prince. These symbols were sometimes chosen on account of an accidental similarity between the name of the symbol and that of the state. Thus, a rose was the symbol of Rhodes; a heart that of Cardia; a pomegranate that of Pamphylia. More frequently, however, the symbols had some local reference. Thus, Egypt was distinguished by a sistrum, an ibis, a crocodile, or a hippopotamus; Arabia by a camel; Africa by an elephant; Athens by an owl; Crete by a labyrinth, and Syracuse and Corinth by a winged horse. In shape most coins are circular, although some have been oblong-oval, octagon, and even square. Coins are usually of gold, silver or copper, and occasionally of brass, white metal, nickel, tin, lead or bronze. More rarely an alloy of gold and silver, or an alloy of silver and tin, were used. There were also coins made with the main body of copper, but with a thin covering of gold or silver, either laid on the form of a thin plate, or by dipping the coin in the molten metal.

**Numismatic Science.**—The study of coins appears to have been entirely unknown to the ancients. It does not appear from any ancient works that any value was set upon coins as curiosities by the collectors of works of art in the times of Augustus, though there were at that time series of coins of cities, some of which have come down to us, and attract attention on account of their antiquity and the beauty of their execution. In the 15th and 16th centuries kings and queens, and private individuals of wealth and culture, particularly in Italy, France and Germany, rivaled each other in zeal for collecting these remains of antiquity, at first principally with a view of obtaining portraits of the chief characters of Roman history. Learned treatises soon succeeded these first collections, in which the chief attention had been paid to striking impressions. The earliest treatises were those of the Italian Enea Vico and the Spaniard Antonio Agostino, both published in the 16th century. In the 17th and 18th centuries, the investigations into the mixtures of metals and the execution of the dies; the form, size, weight, value, and number of the ancient coins; their genuineness or spuriousness, became susceptible of more certainty by the accumulation of materials of comparison; and the understanding of the types and legends was also facilitated by similar means. The coins of the Middle Ages have been sought for with zeal, and along with the ancient coins have been made to throw light upon subjects which manuscripts and writers left unexplained. The literature of numismatics has now become very extensive, but much of it is comprised in periodicals and pamphlets. From a numismatic standpoint, the value of a coin depends largely upon its condition. There are 11 classes, namely: Proof, Uncirculated, Circulated Very Fine, Fine, Very Good, Good, Very Fair, Fair, Poor and Very Poor. Proofs are those coins struck for

# NUMISMATICS.



Nº1.



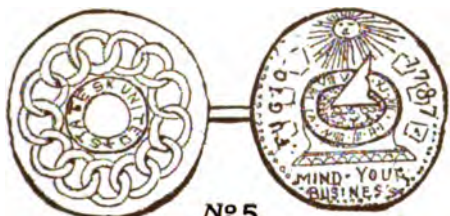
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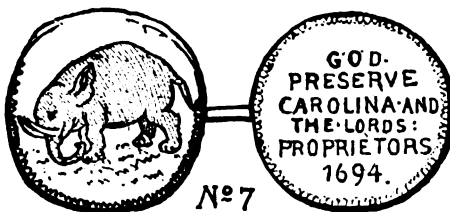
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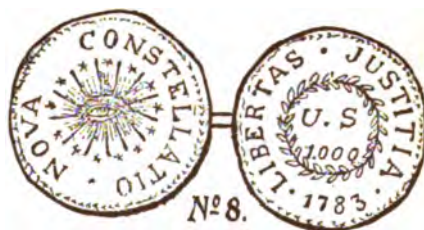
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Nº10.

## AMERICAN COLONIAL COINS.

1. New Jersey Cent.
2. Vermont Cents,
3. Vermont Tokens

4. The Granby Token.
5. The Fugio Cent.
6. Continental Coinage.
7. Carolina Tokens.

8. The Nova Constellatio.
9. Rosa Americana — Two Pence.
10. Sommer Island Brass Coin.



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collectors and not designed for general circulation. They have a polished mirror-like surface and bring the highest prices when offered for sale. Uncirculated coins are strictly unused, being in the same condition as when first issued from the mint, showing no sign of the least rubbing or wear. Circulated coins are those which have been in circulation barely long enough to wear off the mint lustre without rubbing the metal. The size of coins is reckoned by numismatists in the United States in sixteenths of an inch.

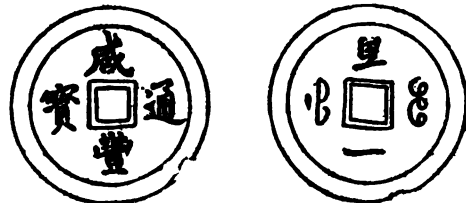
*Ancient History.*—We have no accurate knowledge of the beginning of coinage. Abraham returned from Egypt nearly 2,000 years before Christ "very rich in cattle, in silver and in gold"; and in his purchase of the cave of Machpelah he weighed out the consideration agreed upon, "400 shekels of silver, current money with the merchant." The use of metals, however, in the form of wedges or bars, though a great advancement upon simple barter, or the use of grain, cattle or other commodities, was still attended with inconveniences. "At every transaction the precise weight of metal must be computed; a hammer and chisel must be at hand to cut it off and a balance to weigh it. The fineness of the metal was also to be ascertained." The method of shaping the metal into pieces of convenient size and stamping upon each its exact value ended all these troubles. He who first did this was the inventor of coins; but history is silent respecting his name, his country or the date of his invention. Homer speaks of the workers in metals but makes no mention of coined money. Herodotus says that the invention was Asiatic and that as far as he knew, the Lydians were the first who struck money, and although the oldest coins now extant have usually been supposed to be Grecian, there are reasons for thinking that the invention was Asiatic. Bricks of clay were a primitive coin employed by China, Arabia and Siam before copper money came into general use. Clay was mixed with glue, stamped with a stamp, after having been made into small bricks. Egypt in ancient days made money of several substances. Parchment, leather, pasteboard, wood, covered with wax, and papyrus were employed. They also used scarabei, which were stone and pieces of clay molded into the shape of beetles and tortoises. This was 2,800 years before Christ. Unless marked by authority they passed only at their commercial value; if marked, their value was enhanced.

*Greek and Roman.*—The coins of Greece and Asia Minor are the earliest known to the numismatist. The coins of the kings of Macedonia are the most ancient bearing portraits; and Alexander I., who commenced his reign about 500 years before Christ, is the earliest monarch whose coins have yet been found. Then succeed the sovereigns who reigned in Sicily, Caria, Cyprus, Heraclea, and Pontus. Afterward comes the series of kings of Egypt, Syria, the Cimmerian Bosphorus, Thrace, Parthia, Armenia, Damascus, Cappadocia, Paphlagonia, Pergamos, Galatia, Cilicia, Sparta, Præonia, Epirus, Illyricum, Gaul, and the Alps. This series reaches from the era of Alexander the Great to the Christian era, comprising a period of about 330 years. A perfect and distinct series is formed by the Roman emperors, from Julius Cæsar to the overthrow of the

empire by the Goths. The Roman coins may be resolved into three great divisions, those of the older republic, the consular, and imperial. The consular coins seldom or never bore the names or titles of consuls till toward the close of the republic; nevertheless they are not improperly called consular, because they were struck in the consular times of Rome. These have also been denominated "coins of families," and are arranged according to the names inscribed on them. The brass consular coins are rather uninteresting and few. The imperial coins were those struck after the conclusion of the republican era of Rome down to the fall of the Roman Empire. Some of these coins are artistic; but they are for the most part rude and uninteresting. The materials of which they were composed were, as in modern times, gold, silver and the various modifications of copper.

*The Middle Ages.*—The money of the Byzantine Empire forms a link between ancient and modern coinage. The gold solidus or nomisma was circulated in the west as well as the east of Europe. Then came the silver piece or penny. The Scottish copper coinage, which was of an earlier date than that of England, was preceded by money of bullion, called black money, consisting of copper washed with silver. There are many coins of William I. in 1165; and a large hoard of his pennies was found in 1780. The only silver coin was the penny until the year 1293, when Alexander III. coined also half pence; and there are silver farthings of Robert I. and David II. The groat and half-groat were also introduced by the latter. These all ceased to be coined in the time of Queen Mary, when shillings were first coined, with the bust of the queen on one side and the arms of France and Scotland on the other. The silver crown was first coined in 1565. At the union of the kingdoms all the Scottish coins were called in and recoined at Edinburgh. In France the earliest coins are those of the Merovingian kings. In the 13th century gold coins were issued. In Italy appeared the gold florins of Florence, and in Germany coins of the emperors, the electors and the smaller princes. The coins of Spain began with the Gothic princes. The Hungarian began in the 11th century and the Russian in the 14th. The coinage of Norway and Sweden at first resembled the British type and afterward the German.

*Oriental.*—In India the first coins of the Hindu princes are of the 7th century. Iron coins were minted in China as early as 2454 B.C., and in 14 A.D. a new kind of iron money was coined. These pieces were called yik-tseu, meaning "bended round and surrounded with



Chinese Cash.

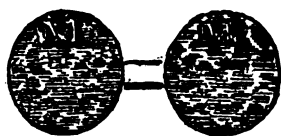
red," on account of the raised edge of the coin, which was made of red copper. An imperial mint was established, and the officers of the



## NUMISMATICS

Sanglin (Academy of Science) were appointed mint masters. The pieces of 5 tsu were then issued, remaining the principal money in circulation for 800 years. After this came a new issue. The coins were circular with a square hole in the centre, in accordance with the Chinese belief that the "heavens are round and the earth square." This coin was called "kai-guen-t'-ling-pao," remaining until the present day. Upon the obverse the inscription reads: "Current money of the newest beginning," and in the exergue the date of the year of the emperor's reign. The principal gold coin was called "kin," a pound of gold.

**American Colonial Coinage.**—The earliest American coins were executed in 1612, for the Virginia Company, at the Sommer Islands, now called Bermudas. The coin was of brass, and bore on the obverse the words, "Sommer islands," and a "hogge on one side, in memory of the abundance of hogges which were found on their first landing." On the reverse was a ship under sail, firing a gun. The earliest Colonial coins were made in Massachusetts in 1652, when a "mint howse" was established at Boston and coins of the value of threepence, sixpence, and twelpence were struck. These



New England Sixpence.

coins were to be of the fineness of "new sterling English money," and every shilling was "to weigh a threepenny troy weight, and lesser pieces proportionately." They were soon after in circulation, but owing to the excessive plainness of their finish they were found to be greatly exposed to "washing and clipping." To remedy this, in the same year "henceforth both shillings and smaller pieces shall have a double ring on either side, with the inscription (Massachusetts) and a tree in the centre, on the one side, and New England and the date of the year on the other side." In 1662 a twopenny piece was added to the series. These coins are now known as the "pine tree shillings," etc. The Massachu-



Pine Tree Shilling.

setts mint existed about 34 years, but all the coins issued bear only the dates 1652 and 1662, the same dies being used probably throughout that period. In the reign of William and Mary copper coins were struck in England for New England and Carolina, having on the obverse an elephant, and the reverse respectively, "God preserve New England, 1694," and "God pre-

serve Carolina and the lord proprietors, 1694." In Vermont a mint was established by legislative authority in 1785, in the town of Rupert, and copper cents were issued of the following description: obverse, a sun rising from behind hills and plow in the foreground—legend, *Vermontensium Res Publica*, 1786; reverse, a radiated eye surrounded by 13 stars—legend, *Quarta Decima Stella*. Connecticut followed the example of Vermont, and in the same year, 1785, authorized the establishment of a mint at New Haven, and copper coins were issued weighing six pennyweights, and having on the obverse a head with the words *Auctori Connect.*; reverse, a female figure holding an olive branch. New Jersey authorized a copper coinage in 1786. The coins were inscribed: obverse, a horse's head with a plow beneath—legend, *Nova Cæsarea*, 1786, etc.; reverse, a shield—legend, *E Pluribus Unum*. Various other coins and tokens were issued by the Colonies.

**United States Coins.**—In the first Constitution of the United States, which was submitted to the States about 1787 for their ratification, it is provided that Congress shall have power "To coin money, and regulate the value thereof." The first Congress which held its session in 1789 was so busy in carrying out the designs of the Constitution in the formation of a Federal Government, that little time or attention could be given to the subject of coinage. About this time a foreigner of the name of John Mitchell proposed to coin coppers for our government. The matter was referred to Mr. Jefferson, then secretary of state, who reported against it. On 15 April 1790, Congress instructed Alexander Hamilton, then secretary of the treasury, to prepare a plan for the establishment of a mint. A long report was made by Mr. Hamilton, in which he proposed the coinage of the following pieces: A gold piece equal in weight and value to 10 dollars; a gold piece equal to a tenth part of the former, this piece to be a dollar; a silver piece which shall also be a dollar; a silver piece which in weight and value shall be the tenth part of a dollar; a copper piece which shall be of the value of the hundredth part of a dollar; a copper piece which shall be half the value of the former. The report was sent to Congress in January 1791, and 2 April 1792 the law "Establishing a Mint and regulating the coins of the United States" was approved by President Washington. The officers to be employed as provided by the Act were, a Director, an Assayer, a Chief Coiner, an Engraver and a Treasurer. The Act also provided that the coins to be struck should be:

**Gold.**—The eagle, of 10 dollars, to weigh 270 grains; the half and quarter in proportion, all to be of 22 carats fineness.

**Silver.**—The dollar of 100 cents, to weigh 416 grains, the half, quarter, dime and half-dime to weigh in proportion, the fineness to be 1485 parts in 1654, or 892.4 thousands.

**Copper.**—The cent to weigh 264 grains and the half cent in proportion.

The President proceeded at once to carry out the provisions of the Act and Philadelphia was selected for the erection of the mint. The foundation stone of the mint was laid on 31 July 1792. In September the building was so far completed that some of the machinery was put in and on 11 September six pounds of copper was purchased at 1s. 3d. per pound. Three

presses for coining which were imported arrived during September and in the beginning of October they were first used in striking half dimcs. All of the pieces struck during this year were classed as pattern pieces, the regular coinage not beginning until the next year, when the Chief Coiner reported on 1 March that 11,178 cents had been struck. The first deposit of gold bullion received at the mint for coinage was in February 1795. Moses Brown, of Boston, Mass., made the deposit which consisted of ingots to the value of \$2,276.22. The Chief Coiner reported the first return of gold coins on 31 July 1795. It consisted of 544 half eagles. Nine deliveries of this same coin were reported during the year. The first eagles delivered was on 22 Sept. 1795, the delivery consisting of 400 pieces. During the 19th century various experiments were made in the value of the American coins, and half cents, three-cent pieces, two-cent pieces and 20-cent pieces were issued and discontinued. In 1903, the coins in circulation were: dollars, half dollars, quarter dollars and ten-cent pieces of silver; five-cent pieces of nickel and silver alloy, and one cent in copper and bronze. See COIN; COINAGE; MINT; MEDAL; TOKENS.

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**Numitor**, nū'mī-tōr. See ROMULUS.

**Num'mulite**, a genus of *Foraminifera*, mainly extinct, which forms vitreo-calcareous, many-chambered shells having much the form of a doubly convex lens, which when flattened by pressure as in fossil examples, led to their being likened to little coins (*nummuli*). They varied in size from that of a pinhead to that of a silver dollar. The group originated in the Carboniferous, increased, and flourished at its maximum during the early part of the Tertiary period, when these foraminifers swarmed in the seas in incredible abundance. Their shells constitute the bulk of the Eocene Nummulitic Sandstone of the Old World, where it is one of the most important, if not the principal formation of the Tertiary series of rocks, in point of extent. Attaining a thickness of many thousands of feet, it ranges from the Alps and Atlas to the Carpathian Mountains; appears in Egypt, Asia Minor, Persia, and can be traced through India and China into Japan. The pyramids of Egypt are built in greater part of this nummulitic limestone. Consult Geikie, 'Text-book of Geology' (1882), and the writings of Lyell, Prestwich and other geologists.

**Nun.** See MONASTICISM; SISTERHOODS.

**Nun of Kenmare.** See CUSACK, MARY FRANCES.

**Nun of Kent.** See BARTON, ELIZABETH.

**Nunc Dimittis**, nunk dī-mīt'is, the first two words of the Latin version of the Song of Simeon (Luke ii, 29, 33), 'Lord now lettest thou thy servant depart in peace,' etc. It was anciently used in the Vespers or Compline services of the Eastern and Western Churches, and is found in the Book of Common Prayer as part of the evening service.

**Nuncio**, nūn'shī-ō, a papal commissioner who permanently represents the Pope abroad, and corresponds to the secular ambassador at a foreign court. A papal commissioner who is sent on a temporary mission is styled a legate and, if a cardinal, is styled a legate, *a latere*, that is, sent immediately from the side of the pontiff. Previously to the Council of Trent the papal nuncios acted as judges in the first instance of matters which lay within ecclesiastical jurisdiction; since that time they have been formed into a kind of court of appeal from the decisions of the respective bishops.

**Nun'comar.** See HASTINGS, WARREN.

**Nuneaton**, nūn-ē'tōn, England, a town of Warwickshire, on the Anker, 17 miles north-east of the town of Warwick. It has two churches, a free grammar and several other schools. Cotton and woolen manufacturing is carried on to some extent. By the amalgamation of Chilvers Coton, a suburb, in the last decade of the 19th century, the population increased from (1891) 11,580 to 26,000 in 1910.

**Núñez, Pedro de Villavicencio**, Spanish painter: b. Seville 1635; d. there 1700. He was of noble birth and early became a pupil of Murillo (q.v.) and one of the best Spanish painters of the Seville School which Murillo preeminently represented. At Malta, where he resided as one of the Knights of the Order of Saint John of Jerusalem, he studied under Mattia Preti (q.v.), called 'Calabrese.' Returning to Seville he lived on the closest terms of intimacy with Murillo who expired in his arms. After the death of his great teacher he went to Madrid and there produced the picture, 'Beggar Boys Playing Dice,' which is altogether in the best style of Murillo. This work he presented to Charles II., king of Spain. 'Scenes from the Life of the Virgin' he executed for the Carmelite Convent at Seville, while his fine likeness of Archbishop Spinola at Seville gives a good idea of his power and style as a portrait painter.

**Núñez, noo'ñās, Rafael**, Colombian statesman: b. Cartagena 28 Sept. 1825; d. there 18 Sept. 1894. After holding posts in the Colombian cabinet and consular service, he was elected governor of the state of Bolivar, and president of Colombia in 1879, 1883 and 1891. He was also a journalist, editing the 'Porvenir' in Colombia and 'El Continental' in New York, and published several volumes of prose and verse.

**Núñez de Arce**, noo'ñāth dā ār'thā, Don Gaspar, Spanish poet: b. Valladolid 6 Aug. 1834. He studied at the University of Toledo, became a deputy in 1865, a member of the Academy in 1876, and minister for colonial affairs in 1882. Subsequently he became a senator and president of the Society of Spanish

writers. His lyric verse won for him the title of the "Tennyson of Spain." Among his works are 'Gritos del Combate' (5th ed. 1885), poems of the revolution; 'La Selva Oscura' (15th ed. 1886); 'La Vision de Fray Martin' (15th ed. 1886, on Martin Luther), translated into German by Fastenrath ('Luther im Spiegel Spanischer Poesie,' 2d ed. 1881); 'Ultima Lamentacion de Lord Byron' (23d ed. 1884); 'El Vertigo,' 25th ed. (1886); 'La Pesca' (15th ed. 1886); and 'Maruja' (9th ed. 1886).

**Núñez de Balboa.** See BALBOA.

**Núñez, Cabeza de Vaca,** kâ-bâ'thâ dâ vâ'kâ, **Alvar,** Spanish explorer in America: b. Estremadura 1507; d. Seville 1564. In 1527 he sailed from Spain in the ill-fated expedition of Pánfilo de Narvaez for glory and plunder, but was captured by Indians and carried about by them in western Louisiana and eastern Texas. He was successful in trade, exchanging the shells and wampum of the coast for hides and other inland commodities. During his eight years' captivity he also gained considerable reputation as a sorcerer, and the reverence in which he was consequently held was undoubtedly an aid to his safety. He finally escaped, fell in with three other survivors of Narvaez' undertaking, ascended the Rio Grande, crossed Chihuahua and Sonora to the Gulf of California, and finally (May 1536) reached Culiacan. The pilgrimage was one of 2,000 miles, and involved every sort of vicissitude. One result of the journey was to recall to Spanish knowledge a great territory north of Mexico and to lead to the strange quest for the seven cities of Cibola. A joint account of their travels, given by the travelers at Santo Domingo was printed in Oviedo's 'Historia General y Natural de Indias.' De Vaca was sent as administrator of La Plata in 1540, and was the earliest explorer of Paraguay. In 1544 he was arrested on the charge of lraia, a follower; sent to Spain; exiled to Africa; and in eight years pardoned. He published an account of his adventures in 1542. This appeared in an English version in 'Purchas his Pilgrimes' (1625); as well as in a translation by Smith (1857-71).

**Nunivak,** noo'nî-vâk, Alaska, an island off the west coast, in the Bering Sea; separated from the mainland by the Etolin Strait, about 48 miles wide. It is about 55 miles long and 40 miles wide; area, about 1,200 square miles. It is fertile and well wooded on the west and south; the inhabitants are Eskimos. They have considerable trade in ivory, skins, and fish.

**Nun's Priest's Tale,** The, one of the stories in Chaucer's 'Canterbury Tales.' Its origin is a fable by Marie de France which was subsequently amplified in the 'Roman du Renart.' It relates the escape of Chanticleer from the jaws of the fox by inducing the latter to open his mouth for speech. Dryden modernizes the story in 'The Cock and the Fox.' In Æsop's Fables a similar narrative occurs.

**Nuphar,** a genus of yellow water-lilies, order *Nymphaeacea*. See WATER-LILY.

**Nur-and-Spell,** an old English game, peculiar to the rural districts, played with a ball, which is "risen" from a trap and hit with a bat made for the purpose. The ball, called the "nur," is made of wood, a little bigger than a walnut. The bat, called a "tripstick," as it is

also used to spring the trap or "spell," consists of a piece of hard wood, 6 by 4 inches, and 1 inch thick (the pommel), attached to a supple handle from 3 to 4 feet long, which the player grasps with both hands, giving the full swing of his body with the stroke. The game consists of the cumulative distance of a given number of strokes, the player who has the greatest number of yards being the winner.

**Nur-Ed-din El-Betruij,** noor-ed-dên' êl-bê-troo'jê, Arabian astronomer: b. Morocco, 12th century. He was known also by the name of Alpetragius and was an authority upon astronomy in his day. He disproved Ptolemy's theory of the epicycle. See 'Alpetragii Arabis Planet. Theoriae phys. Rationibus Probata' (1531).

**Nureddin - Mahmud,** noo-rêd-dên' mǎ-mood', **Malek al-Adel,** sultan of Syria and Egypt, styled "Al Shahid," "the Martyr": b. Damascus 21 Feb. 1116; d. there 15 May 1174. He succeeded his father as emir of Aleppo in 1145 and repelled Jocelin de Courtenay's attack on Edessa. He held the armies of the second crusade (1147) at bay, and, after their departure, invaded Antioch and speedily wrested from the Christians all northern Syria, making Damascus his capital. The alliance of the Greeks and Franks against him came to nothing, and Nureddin extended his power to Egypt. But there his lieutenant Shirkoh was succeeded by the great Saladin (q.v.), who gradually made himself independent of his master. Nureddin was on his way to Egypt to punish Saladin when he died. He was highly praised by Christians and Mohammedans as a just, charitable and noble character.

**Nuremberg,** nû'rēm-bêrg, or **Nürnberg,** Germany, a city of Bavaria, in Middle Franconia, the second city in the kingdom, and once the greatest and most wealthy of all the free imperial cities of Germany, on the Pegnitz, 93 miles northwest of Munich. It is surrounded by an ancient wall flanked with towers and pierced with 10 gates, the whole enclosed by a dry ditch 100 feet wide and 50 feet deep; parts of these fortifications have been removed to make way for great extensions and improvements. The Pegnitz, traversing the town from east to west, divides it into two nearly equal parts—the north, or Sebalderseite, and the south, or Lorenzerseite, connected by numerous bridges. Notwithstanding modern improvements the city remains the quaintest and most interesting of Germany, owing to its many picturesque mediæval features. The Burg or royal palace, built (1024-1158) by Conrad II. and Frederick Barbarossa, commands a glorious view of the surrounding country, and is rich in paintings and wood-carvings. Among conspicuous public buildings the town-house, an Italian building of three stories, with a fine front, and a great hall, the walls of which are decorated with paintings in oil, many of them by Dürer. The Germanic National Museum, founded in 1852 in a suppressed Carthusian monastery, a Gothic building of the 14th century, with extensive cloisters, and since much extended by the addition of the rebuilt Augustinian monastery adjoining, now ranks among the first in Germany, and is exceedingly rich in works illustrative of the arts and industries of the Middle Ages. The most remarkable edifice is Saint Se-

## NURHAG — NURSE

bald's Church, which gives its name to the north division of the town, a Gothic structure of great elegance externally and internally (its older parts dating from the 10th century), containing the shrine of Saint Sebald, a tomb in bronze by Peter Vischer, who, with his five sons, labored upon it for 13 years, and adorned it with nearly 100 figures, among which those of the apostles are conspicuous for size and beauty. Other buildings deserving of notice are the church of Saint Lorenz, containing a remarkable pyx by Adam Kraft, exquisitely sculptured in white stone, 64 feet in height. There are several public fountains, the chief being the *Schöne Brunnen*, in the form of a graceful Gothic cross 63 feet high, adorned with figures. There are statues of Dürer, Hans Sachs, Melanchthon, and others. There is also a monument of the war with France, erected in 1876. The town library contains 80,000 volumes, and educational institutions are numerous. Communication between the various parts of the town and with the suburbs is facilitated by electric tramways. Before the passage to the East Indies round the Cape of Good Hope was discovered Nuremberg was the great mart of the produce of the East coming from Italy and going to the North. The manufactures are still considerable, and again rapidly rising in importance. Among the most important at the present day are toys, lead-pencils, colors, chemicals, clocks and watches, brass and steel wares, playing cards, tobacco and cigars, railway-carriages, machinery, electrical apparatus, musical and scientific instruments, beer, etc. The toys made here and in the neighborhood go to all parts of the world. Printing, lithographic work, type-founding, and book-binding are also extensively carried on. There are schools for the training of mechanics; and there is a large industrial museum. The town is celebrated, in connection with its industry, for the invention of watches, wheel-locks (used in discharging old muskets), gauge-plates for drawing brass-wire, clarinets, and air-guns.

Nuremberg, though an ancient city, does not carry its origin so far back as Roman times. It had acquired considerable importance by the 10th or 11th centuries, and was frequently visited by the emperors of Germany. It was greatly enlarged by Conrad III., and received several embellishments and important privileges from Frederick Barbarossa. In 1219 it was raised to the rank of a free city of the empire. It early took part in the Reformation. Subsequently it suffered during the great European wars, and being repeatedly laid under contribution by both parties, became so exhausted that the sources of its prosperity were almost dried up, and the population rapidly decreased by extensive emigration. Having finally incurred a load of debt, which made it an acquisition of little value to any state, it was formally taken possession of in 1806 by Bavaria, which undertook the settlement of its debts, and, by judicious arrangements, has considerably increased its trade. Many distinguished individuals have been born here, among them the poet Hans Sachs, the painter Albert Dürer (whose house may still be seen), and the sculptors Peter Vischer and Adam Kraft.

**Nur'hag**, ancient round towers on the island of Sardinia. They are about 50 feet high and about 90 feet in diameter, measured at

the base and outside of the platform on which the largest of them are founded. The materials are limestone, trachitic porphyry, granite, or volcanic rocks, obtained from neighboring quarries. Each block forms a cube about 3 feet each way, and its surface is an irregular line, such as the blows of the hammer in shaping it may be supposed to have made; the walls are without cement, within as well as without. A wall of 10 feet, built like the main structure, is surrounded by a parapet 3 feet high. The roof of each apartment is arched; the entrance terminates in a flat architrave, and is sometimes so high that a man can enter without stooping, and sometimes so small that he can only creep into it on his stomach, though it gets wider as he proceeds. Hence the low chambers are mere cells formed in the thickness of the wall, while the high chambers are supported by pillars. In the cells broken human bones mixed with earth, like that of ordinary graves, have been found. It is many centuries since these remarkable monuments attracted attention. The origin and aim of these structures is still, however, not free from doubt, though they are generally regarded as tombs, constructed so as to be available, in emergencies, for purposes of defense.

**Nurse, Trained**, is one who has followed a course of training in a school for nurses connected with large city hospitals, for two years or more, and who has received a diploma after a severe examination, and has been graduated. It was not until the early part of the 12th century that a so-called school for nurses was organized, by the Abbess Hildegard, among her friends and associates for service in the hospitals. From this small beginning grew the system of a special training for nursing, which, however, remained in its infancy until the middle of the 19th century. In 1840 there was an organization of nurses in London which cared for the sick poor, but it remained for Florence Nightingale to give the impetus to a movement toward securing a more efficient training for nurses. This movement Miss Nightingale started in 1853. In 1870 Miss Louise Lee Schuyler, who was the founder of the New York State Charities Aid Association, organized the Bellevue Training School for Female Nurses in New York city, and in 1872 the first class of trained nurses in this country was graduated from Bellevue Hospital. Now nearly every large hospital in the country has its training school.

The term of study, in most of the schools, is two years. In some of the small towns the course may be one year or 18 months, and in some schools three years is required. Application is made to the superintendent of the training school, and after a physical examination, the applicant is received on a two months' probation term. During this period the applicants receive board and lodging, but serve without pay, and education, strength, powers of observation and endurance are tested. If, after this probation, they prove acceptable to the superintendent, they are required to sign an agreement for the balance of the term, whereby they bind themselves to obey the regulations of the hospital and remain in the school until the term is ended. This agreement can be terminated for cause by either party. Pupils reside in the "home" connected with the hospital, wear a uni-

## NURSE

form, while on duty, and receive board, lodging, laundry work and a small compensation, generally \$10 or \$12 a month. Lectures are given by the members of the staff of house physicians, the visiting physicians and surgeons, and head nurses. The lectures by the physicians cover anatomy, physiology, materia medica and all departments of medicine. The head nurses teach bandaging and the dressing of wounds. Obstetrics and the care of the insane are also taught. Massage is taught in a degree; but if a nurse wishes to take the full course, it requires a six month term in a regular massage school. A diet-kitchen, where proper food for the sick is prepared, is generally under the charge of one of the head nurses. The first three months are occupied by the pupils in a general observation of the work of the hospital ward's head nurse and the assistant nurse. The care of the beds of the patients is one of the first duties learned. Taking the pulse, temperature and respiration of a patient and making a record of it on a chart provided are the next steps. In the surgical wards the dressing of slight wounds is a part of the duties, and probably the pupil must assist in the care of the operating room and making ready the dressing to be used after operations have been performed. The pupil is then examined and, if the examination is satisfactory, advancement to assistant nurse follows. After three months more comes another examination, and at the end of a year, still another. The pupil then is a full fledged nurse and is placed in charge of a ward, and full responsibility for the condition of the patients is placed upon her. She must receive the new patients sent from the receiving ward, note their condition, and if she thinks it warranted, send for the house physician at once. Otherwise the patients wait until the regular call. She must go with the house physician, when he makes his visits to the bedside of each patient, carefully note his diagnosis of each case; make a memorandum of the medicines prescribed and see that the medicine is properly administered. She must note the least sign of change in the patient's condition, and, if for the worse, call the physician at once, or in extreme emergency, be ready to know what to do and do it at once. She must be extremely self-reliant and be ready to know how to act on the instant, as the life of the patient very often depends on quick action. After graduation she goes into private practice and must be prepared any hour, day or night, to respond to a call. The salary received varies from \$25 to \$50 a week, according to the severity of the case.

In December 1887, D. O. Mills of New York, after a visit to the city hospitals, decided that the number of infirm and sick men who were in the hospitals made it a necessity to educate male nurses, and he organized the Mills Training School for Male Nurses of Bellevue Hospital, put up a building on the Bellevue grounds and gave it to the City of New York to be used as a "Home" for the male training school. The first class of male nurses was graduated from Bellevue in 1890. The male training school idea was taken up by the physician in charge of the City Hospital, on Blackwell's Island, and the first class graduated from there in 1890, shortly after the Bellevue class. The training is the

same as in the female schools, the only difference being that greater attention is bestowed upon diseases of men. When the male nurse begins private practice his salary ranges from \$5 a day of 12 hours to \$10; and, in contagious or infectious diseases, to even more.

State registration of trained nurses is now a law in New York, Virginia, North Carolina and New Jersey. The Legislatures of these States passed bills in 1903 requiring trained nurses to register their names and addresses with the county clerk of their respective counties. In the State of New York registered nurses are entitled to use the abbreviation "R. N." after their names, and it is made a misdemeanor punishable by fine for any person not a trained nurse to use the abbreviation. Nothing, however, contained in the acts is considered as conferring any authority to practise medicine or to undertake the treatment and cure of diseases. Examinations are held under a commission of five members of the New York State Nurses' Association, appointed by the Regents of the University of the State of New York. They grant certificates which may be revoked for sufficient cause, after written notice to the holder, and no person is allowed to practise as a registered nurse after such certificate has been revoked. The law in the other States is virtually the same as in New York. The best known training schools are those connected with the Bellevue, Presbyterian, Mount Sinai and City Hospital in New York city; the Massachusetts General Hospital, in Boston; Philadelphia and Pennsylvania Hospitals in Philadelphia; Johns Hopkins Hospital in Baltimore and the Illinois Training School for Nurses, Chicago. The first class of young negro women ever graduated as trained nurses was sent from the Lincoln Hospital and Home, New York city, in December 1903.

The buildings of the New York City Training School for Nurses, of the City Hospital, Blackwell's Island, were dedicated 3 Dec. 1903. There are three buildings; the first named "Jones Hall," as a tribute to the services of Mrs. Cadwalader Jones, who has been the chairman of the advisory board of the school since its organization in 1875, and its reorganization on more distinctively educational lines in 1888 was directly due to her efforts. The building is a four-story structure 35 by 107. The first story contains a class room, drawing room, and two rooms for the isolation of contagious cases of sickness among the nurses and their cure. Each of the other three stories contains rooms for the accommodation of 18 nurses. The second building is named "Rice Hall," in honor of Mrs. William B. Rice, who is a member of the advisory board of the City Training School and of the Board of Managers of the Bellevue Training School. This building contains, on the first floor, the offices of the school, the chemical and bacteriological laboratories and a room for the classes in dietetics. The other three stories contain rooms for 16 nurses. The central building was christened "Schuyler Hall," in honor of Miss Louise Lee Schuyler, the founder of the Bellevue Training School for Nurses, and contains the kitchen, dining room and rooms for 20 nurses.

FRED H. ADAMS.

*Staff of the New York City News Association*

## NURSE-FROG — NURSERY FOR CHILDREN

**Nurse-frog**, any of various frogs and tree-frogs which have or make special arrangements for the care of the eggs or young, or of both. The most widely known example is probably the European obstetrical frog (q.v.), the male of which takes charge of the eggs as soon as laid by the female, and carries them with him until they hatch. Many other species, especially among those living in the American tropics, take precautions as to their offspring. Thus one, the Brazilian ferreiro (*Hyla faber*) makes beneath the water in the ponds where it goes to spawn, small walled-in basins of mud, within which the spawn is deposited and the tadpoles are reared in safety from many enemies that would attack them were they running at large. Several kinds of frogs have their few eggs placed upon the back of the female, in pits or pouches in the skin, and keep them there until they hatch; and in one well known genus (*Phyllobates*) the tadpoles cling to the mother's back, and are carried about and cared for until able to transform and care for themselves. Consult Gadow, 'Amphibia and Reptiles' (1902). See FROG; MARSUPIAL FROG.

**Nurse-shark**, a name given by American fishermen to several different kinds of shark, as the Sleeper (*Somniosus microcephalus*), and especially a voracious tropical shark (*Ginglymostoma cirratum*) abundant about the coral reefs of the West Indies and the coast of Mexico, where it is called *gata*. The Port Jackson shark (*Cestraciont*) is sometimes called nurse-shark.

**Nursery**, in agriculture, a place where shrubs and trees are raised for transplanting or for sale. In America the term excludes florists' establishments and other places where herbaceous plants are grown, being restricted to places where woody plants are propagated, the division resulting from the earlier development here of the orchard and other fruit interests, and from the different kinds of equipment required by the two branches. There is apparent a further division of the nursery business proper into establishments for growing (a) ornamental, and (b) useful plants. The commercial history of this industry is confined to the 19th century, paralleling and fostering the development of the fruit industry, and extending westward and southward from western New York which has long been the centre of the business, with headquarters at Rochester. According to the census statistics of 1900, the industry represents a capital investment of \$52,500,000 in 4,500 nurseries, covering an acreage of 172,800 acres. To operate this area there were required 45,600 men, 2,279 women, 14,200 horses, mules, etc. Of the 3,400,000 plants grown 518,000,000 were fruit trees, of which 240,500,000 were of apple alone. Grape vines and small fruits aggregated 685,600,000. From other estimates it is concluded that in most species less than half of the plants grown in nurseries reach maturity; for instance, the census of apple trees in 1900 was 201,794,764, of which a large proportion are young trees not in bearing.

The great majority of trees raised in the fruit nurseries of America are for orchard planting and are trained erect; whereas in European nurseries they are trained in many forms, such as espaliers, dwarfs, standards, bushy forms, etc. Ornamental trees are largely grown from cut-

tings, layers, etc., fruit trees from scions, either by grafting or budding (see GRAFTAGE). The former method is preferred in the western States, first, because more than one tree may be obtained from one root used as stock, and second, because the long scion placed upon the foster stock will take root if placed far enough below the surface, a process which eliminates much of the uncertainty felt with respect to hardiness of trees upon nondescript stocks. In the East fruit trees are generally budded, since budding supplies whole roots in full activity at the time of performing the operation.

To supply the nurseries with stocks for the various fruit trees, specialists have arisen, particularly during the closing decade of the 19th century, and the nurseryman who raises his own stocks, except of peaches, is the exception. France supplies most of the pear and cherry stocks, and many stocks of other kinds; the prairie States furnish the great bulk of the apple stocks. The fruit tree nurseryman therefore confines his efforts largely to the propagation of the plants after budding or grafting. He is thus enabled to bend his energies to the production of large trees in restricted time, a process which is believed to exhaust the soil to such an extent that two crops of nursery trees are rarely grown upon the same land oftener than once in five years, during which time the land is devoted to clover or other crops which tend to improve the texture of the soil and the content of humus. Hence nurseries are likely to change their situations frequently and hence to occupy rented land. Ornamental and forest trees are believed to be less exhaustive and are thus more stable in their establishment. Commercial manures seem to be slower in bringing "treed" land into condition again than are stable manure and green crops.

Prior to the establishment of the agricultural experiment stations, nurseries exercised a profound influence upon the fruit industries throughout the country. Though they still play an important role they have a narrower scope, much of the variety-testing at present being conducted by the experiment stations. The leading nurseries are still looked to for much authoritative information, and they still seek to maintain and foster their business by honest and conservative methods and the sale of correctly named and healthy stock only.

Since the introduction of new fruits from abroad, or even from other localities in the United States, has been found to bring into action new insect and fungus enemies, State legislation has established inspectors of nursery stock. The most progressive nurserymen, accordingly, have adopted methods of control such as fumigation-houses. Badly infested stock is generally destroyed as the best means of preventing the spread of the pests to new, uninfested localities.

For the unification of interests and the improvement of methods the American Association of Nurserymen was formed, and a monthly magazine, 'The American Nurseryman,' is published at Rochester. Consult Bailey, 'The Nursery-Book' (1896).

**Nursery for Children**, Hygiene of the. There is no part of the home requiring more particular and intelligent care with respect to the conditions of health than that which is assigned to the children of a household. The



## NURSERY LORE AND NURSERY RHYMES

children's apartment should be a large; sunny, dry, and well-ventilated room. Absence of sunlight is as bad for children as plants—both grow pale and sickly in consequence of it. Excess of sunlight can be averted by blinds, awnings, or dark-colored (preferably green) window-shades. The room should be above the first floor, in a well-built house, on dry ground, and should have good plumbing. The furniture of a nursery should be comfortable, but simple and easily cleaned. The floor is best covered with a carpet or rug which can be readily removed for cleansing, or when a contagious illness prevails. The walls should be either painted (preferably a light gray), varnished, or covered with a varnished paper which can be washed. Dirt must be kept out of the nursery. There should be no heavy furniture. All cupboards and closets should be kept clean and well aired. There should be no "tuck-away" places. Dusting, as ordinarily carried out—that is, the transferring of dust from one place to another—should be unknown. Dust should be removed by hand, with a slightly moistened piece of cheese-cloth, and with the cloth fastened in a metal grasp fitted to the end of a pole made for that purpose. The floor should be swept after moistened tea leaves or sawdust have been sprinkled over it. The corners of the room should be rounded so that no dust can lodge in them.

*Ventilation and Warming.*—While a nursery should be always comfortably warm, it should be well aired or ventilated, and fresh air must come from out of doors. Few houses are equipped with such a good system of heating and ventilation that the opening of a window to admit air is not necessary. But cold air should not blow upon the child. In fact, in cold weather children should not be allowed to stay near a window, even if closed, as it is the cold air that comes through crevices that "cuts like a knife." As the current of cool air is greatest along the floor of a room, in cold weather children should not sit upon the floor. The room may be frequently ventilated by opening a window for a short time at the top, the children meanwhile being more warmly clad. Or the air may be admitted through an elbow tube, or through the space between the upper and lower sash, the lower sash being raised several inches and having under it, along its entire length, a board (window-board). A stout piece of cloth, decorated if desired, may be fastened across the lower part of the window, with the window raised nearly to the upper edge of the cloth, the air comes tempered through the cloth, and also between the upper and lower sash. The upper sash may be lowered a few inches, and a frame covered with one or more layers of cloth fitted in between the sash and the window-frame. As lamp and gas light readily pollute the air of a room, protected candles are better.

The temperature of a nursery should be from 65° to 70° F. Open fire-places, the Franklin and barrack stoves, or hot-water pipes are frequently better for heating purposes than close stoves or furnaces, which unduly dry the air. If close stoves are used they should have no dampers. All heating and lighting apparatus should be well protected, so that children cannot burn themselves or set fire to anything.

*Nuisances and Sources of Contamination.*—There should be no imperfect plumbing in the nursery—in fact, all plumbing would better be in an adjacent room. Soiled napkins and other offensive articles should be promptly removed from the nursery, also remnants of food. Toys should, so far as possible, be unpainted and clean. Disinfectants are rarely needed, except in cases of sickness, if sunlight, good air, and cleanliness are secured.

*Toilet.*—While a warm bath, with the occasional use of a pure soap and thorough drying, is necessary, the child should become accustomed to cool water. This can usually be accomplished by gentle sponging with cool water after the use of warm water. A child does not always need a daily bath. Soft towels or cloths are best for drying purposes. Toilet-powders need not be used except where the skin remains moistened. Much of the soreness upon the buttocks and in the groins can be prevented by the use of dry, soft napkins, washed in soft water and with a soap containing little alkali. The scalp and teeth should be kept clean, and only soft brushes employed. A comb should rarely be used.

*Dress.*—This should be sufficiently warm, and as small in amount as is consistent with comfort. The underclothing is of the most importance, and should be of woolen or linen mesh-work of varying degrees of thickness, depending on the seasons of the year. The fabric of children's clothing should be soft. Tight constriction by bands is injurious. When a child begins to use its limbs freely the clothing should be shortened. Shoes should be soft, and for young children without heels, and should not cramp the toes.

*Food.*—The child's food should be well cooked and clean; the milk should be pure; if there is any doubt as to its purity it should be sterilized. Long-tubed nursing-bottles should not be used. All receptacles of food should be kept clean. Boiling and straining the drinking-water is frequently advisable. It should be cooled by placing it in corked bottles in the refrigerator.

*Nursery Lore and Nursery Rhymes* are songs and jingles for children handed down from past generations. These folk-lore jingles are mechanically repeated in the play-room and on the play-ground, the children having little if any knowledge of the significance or origin of the rhymes. Being in verse form they are easily preserved, either as mere traditional rhymes, or as formulas to be used in games; and, as unconscious survivals of a remote antiquity, they not infrequently preserve for the scientific inquirer fragments of ancient incantations for healing diseases or revealing the future, and invocations combined with ceremonial observances, while the intimate nature of the religious conceptions involved points back unmistakably to a mediæval origin. Children with all their inventiveness and imagination are slaves of the letter, and most of their game-formulas are handed down from generation to generation along with the games themselves. In their characteristic directness, point, and quaintness of phrase, they defy imitation, and in their faculty of arresting the imagination from age to age they reveal the instinct of perpetuity. Many of them are beyond doubt survivals among children of May games,

## NUS — NUTCRACKER

ring-songs and dances, rounds, and kissing games which in old England were played by grown-up people, and these of the higher grades of society. Many of these are still current in America which are now forgotten in the mother-country, although they not infrequently have equivalents on the continent of Europe. Under the same general head are included nursery rhymes proper, and counting-out rhymes, cumulative rhymes, courting and love games, playing at work, flower oracles, and riddle and guessing games; while on the other hand popular mottoes, old saws and maxims relating to husbandry, the weather, or the like, and all the wealth of local rhymes and sayings belong to the popular rhymes of folk-lore generally. The verses usually consist either of a rhyming couplet, or of four lines in which the second and fourth rhyme; they are often accompanied by a refrain, which may be a single added line, or may be made up of two lines inserted into the stanza; and in place of exact consonance, any assonance, or similarity of sound, will answer for the rhyme.

Upon the subject of nursery rhymes upward of 70 volumes have been published and none of these are more authentic than 'The Games and Songs of American Children' by W. W. Newell, published in 1884. Other works are: Chambers, 'Popular Rhymes of Scotland' (1842); Halliwell, 'Nursery Rhymes of England' (1860). See also FOLK-LORE; PROVERBS; RIDDLES.

**Nus**, Eugène, è-zhân nûs, French dramatist: b. Châlons-sur-Saône, France, 1816; d. 1894. He was an ardent Socialist, and his first success as a dramatist was with his 'Jacques le Corsaire' (1844). Among his works are: 'L'Enseignement mutuel' (1846); 'Choses de l'autre Monde' (1880); 'Vivisection du Catholicisme' (1894); etc.

**Nusku**, noos'koo, in Assyrian mythology, a solar deity who afterward became a fire god. He was regarded as a messenger of the gods.

**Nussbaum**, noos'bowm, **Johann Nepomuk**, German surgeon: b. Munich, Bavaria, 2 Sept. 1829; d. there 31 Oct. 1890. He studied in Munich, Würzburg, Berlin, and Paris, and in 1860 became a professor at the University of Munich. He published: 'Die Pathologie und Therapie der Ankylosen' (1862); 'Die Verletzungen des Unterleibs' (1880); 'Ueber Chloroformwirkung' (1885); etc.

**Nût**, noot, in Egyptian mythology, the goddess of the sky, wife of Keb, the god of earth.

**Nut**, a piece of metal tapped, and adapted to be screwed on the end of a butt. It is used for many purposes, but especially on the end of a screw-bolt, in order to keep it firmly in its place.

**Nut Brown Maid**, **The**, an old English ballad, the earliest extant form of which is found in Arnolde's 'Chronicle' (1502). It is based on the legendary story of Henry Clifford, known as 'The Shepherd Lord.' Consult Percy, 'Reliques,' series 2, book i., 6.

**Nut-gall**, a hard, nut-like gall (q.v.), especially those from the Asiatic oaks, used in ink-making and for other purposes. The Chinese and Japanese nut-galls of commerce, however, are from species of *Rhus*, and are large

and very irregular in form. They contain from 30 to 60 per cent of tannin, and are the source of gallic acid ( $C_7H_5O_6$ ) which appears in white silky needles, soluble in alcohol, less so in ether, and sparingly soluble in cold water; it is precipitated blue-black by ferric salts, the color disappearing on boiling, and is not affected by gelatine, except in the presence of gum. Consult Maisch, 'Materia Medica' (2d ed. 1885).

**Nut-grass**, or **Chufa**, a sedge of the genus *Cyperus*, especially *C. esculentus*, of the Eastern and Southern States, whose root-stocks bear small tubers, like nuts, which are edible to man, and of good flavor when roasted; and which are highly nutritious to hogs who eagerly search for them. Consequently these sedges are planted in some parts of the country as a food-crop for swine. An oil may be expressed from these tubers, or "ground-almonds," which is an excellent substitute for olive-oil for table use.

**Nut-lock**, a means for fastening a bolt-nut in place preventing its becoming loose by the jarring or tremulous motion of the machinery. Such are used upon fish-plates of railways, upon harvesters, etc.

**Nut-weevil**, a snout-beetle of the genus *Balaninus*, which deposits an egg in the kernel of a nut, when it is young, where the egg hatches and the grub feeds until the kernel is destroyed, when it bores its way out through the shell. Several species infest the various commercial nuts.

**Nuta'tion**, a slight change in the direction of the earth's axis produced by the same cause as the precession of the equinoxes, namely, the attraction of the sun and moon upon the equatorial protuberances of the earth. If the orbits of the earth and moon were circular and in the same plane, the motion of precession, which consists in a slight revolution of the direction of the earth's axis in a period of about 266 years, would be regular and uniform. But, owing to the inclination of the orbits, and the revolution of the moon's node, the real direction of the axis of the earth revolves in a small circle around its mean direction in a period the same as that of the moon's node, namely—18.6 years. Bradley discovered and explained nutation not long after his discovery of the aberration of the fixed stars.

**Nutcracker**, the English name of a species of crow (*Nucifraga caryocatactes*) found ranging over a wide area in the pine forests of northern and sub-Alpine Europe and Asia. It is dull brown, thickly speckled with white spots, and is about the size of a jay. The nutcracker is gregarious, wandering in bands of 50 or 100 in the autumn, but scattering to remote regions and becoming silent during the breeding season. Its chief food is nuts and seeds of conifers. It is said to hold nuts and cones with its foot and to extract the kernels by repeated blows of the bill.

A closely related American bird is Clark's crow (*Picicorvus columbianus*), discovered by the Lewis and Clark expedition in 1804-6. It is about one foot long, of a generally gray color, the wings and tail black with large white areas. It inhabits the coniferous belt of the Rocky Mountain slopes and congregates in great flocks,

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which rove in search of food. The well-concealed nest is built in the tops of pine trees in the higher mountain ranges. Consult Coues, 'Birds of the Northwest' (1874).

**Nut'hatches**, small passerine birds forming the family *Sittidae*, related to the titmice, from which, and from the creepers, they are readily distinguished by the long, straight, slender bill. The typical genus (*Sitta*), with about 15 species, is confined to North America, Europe and Asia, but some related genera are found in the Southern hemisphere. In the United States we have four species and several sub-species. The common resident eastern species (*S. carolinensis*) is nearly six inches long and has the under parts white. The red-bellied nuthatch (*S. canadensis*) is an inch shorter, with the under parts rusty brown and the glossy black cap cut by a pure white stripe on each side. This is a migrant species, which breeds in the northern States and Canada and on mountain tops, but in winter extends its range to the Gulf coast. Two still smaller species, the brown-headed nuthatch (*S. pusilla*) and the pygmy nuthatch (*S. pygmaea*), are respectively southern, and far western. Both have the crown brown, not black, as in the other two species, and *S. pygmaea* may be distinguished by the black and white markings on the middle tail-feathers, which are plain in *S. pusilla*. The habits of all are similar. They spend their time in traveling restlessly up and down the trunks and limbs of trees in the most nimble manner, hanging in any attitude supported by their strong, large feet alone and without the assistance of the tail. Consequently they display greater freedom of movement than either the woodpeckers or the creepers. Their food consists chiefly of insects and their eggs. In the autumn and winter they have the habit of wedging acorns and nuts firmly in crevices, and hacking them with the bill till they break open: this is done partly for the kernels and partly for the grubs which they frequently contain. From this habit the common name is derived. Their only note is a hoarse call. They nest in holes in trees, often in crevices beneath bark, and lay four to eight speckled eggs.

**Nutmeg**, the hard kernel of the fruit of various species of *Myristica*, especially *M. fragrans* or *moschata*, of the order *Myristicaceae*. The common nutmeg-tree grows about 25 feet high, bears oblong, entire leaves, axillary racemes of small flowers, followed by golden yellow pear-shaped fruits which split in halves, exposing the kernel surrounded by a false aril which forms the mace (q.v.) of commerce. The fleshy halves of the fruit are used as preserves in countries where the trees are cultivated. Various species are cultivated in the tropics, particularly the East Indies, West Indies, Brazil, and Spice Islands. They are among the most important spices as which they are chiefly used. A fatty oil called oil of mace is expressed from the seed, and a nearly colorless essential oil is obtained by distillation. The tree thrives in the West Indies up to elevations of 2,000 feet, but is less productive there than at lower altitudes. It does best in well drained, rich loam, in warm, protected valleys.

**Nutmeg-bird**, a name among bird-dealers for an East Indian mynas (*Munia undulata*), also known as cowny-bird; it is brown, with

white streaks above and spots below, a yellow rump, and a white middle to the under parts. An eastern fruit pigeon (genus *Myristicivora*) is also so called, because it feeds upon the nutmeg fruit.

**Nutmeg Melon**. See **MELONS**.

**Nutmeg State**, a popular name for the State of Connecticut, derived from the alleged ingenuity of Yankee inventors who were facetiously charged with manufacturing wooden nutmegs to be sold as genuine.

**Nu'tria**. See **COYPU**.

**Nutrition of Farm Animals, The**. The common domestic animals are fed for a variety of purposes. With cattle, sheep, and pigs, it is the object to induce gains in weight, that is, to fatten them, or in the case of milch cows, to produce gains in the form of body secretion,—milk, rather than fat on the body. In a similar way, sheep are fed for the production of wool; goats for milk or their fleece, and poultry, for the market and the production of eggs. Cattle are sometimes, and horses are almost universally, fed as beasts of burden. Animals with young require food for their development and after birth the young animal needs it for growth and the development of the body as well as for maintenance.

A great deal of information regarding food requirements has accumulated from the experience of countless generations, and for many years the problem has been studied experimentally at agricultural colleges, experiment stations, and similar institutions, in this and other countries. It is fair to say, at the present time, that the feeding of farm animals rests upon quite well defined general principles, derived from the studies of the chemist and the animal physiologist, concerning the composition and functions of food and the way it is utilized after it is eaten. Such studies show that the materials composing the body are constantly breaking down and being consumed, and that to keep the animal in a healthy and vigorous condition requires a constant supply of new material; if this is lacking or is insufficient, hunger, and finally death, result. To supply the needed materials is one of the chief functions of food, but in addition to this it maintains body temperature and also furnishes the force or energy which enables the animal to do work; and to perform the necessary functions of the body, such as keeping up the beating of the heart, the respiratory movements, and so on. Since it furnishes heat and energy, the food may be said to serve as fuel. If, in addition to maintaining the system, growth is made, as in case of a young animal, or milk is secreted, more food is needed than for maintenance. If the supply is in excess of all demands, some is stored as a reserve material, principally in the form of fat. To supply food in the right proportions to meet the various requirements, without waste, constitutes scientific feeding. By carefully studying the composition of feeding stuffs, the proportion in which they are digested and the requirements of different animals when at rest, at work, producing wool, giving milk, etc., the principles of feeding have been deduced. In applying these in practice, the cost and special adaptations of different feeding stuffs must also be taken into account.

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The animal body and the different feeding stuffs which nourish it are all made up of a comparatively few chemical compounds, namely water, ash or mineral matter, and the so-called nutrients, protein, fats and carbohydrates, the carbohydrates being subdivided into two groups, namely, "nitrogen free extract," that is, sugars, starches, etc., and "crude fibre." Of these protein is the only nutrient which contains nitrogen, the characteristic element of body tissue, and is therefore the only one which can truly serve for building and repairing the animal body. Fats and carbohydrates serve as fuel and yield energy in the forms of heat and muscular power. Protein may also serve as a source of energy and thus has a two-fold function.

*Water.*—Water, though not a nutrient, is essential, being needed to dilute the blood and for other physiological purposes. All animals also require oxygen of the air for maintaining the life processes. Water constitutes from 40 to 60 per cent and ash from 2 to 5 per cent of the body; fat varies greatly with the condition of the animal, but seldom falls below 6 or rises above 30 per cent. The dry matter of the flesh, skin, bones, muscles, internal organs, brain, and nerves, in short, all the working ma-

chinery of the body, is composed quite largely of protein. (See NUTRITION OF MAN for more extended discussion of nutrients.)

*Character of Food.*—The feeding stuffs of most importance for farm animals are of vegetable origin, and include cereal grains, such as oats and corn, either ground or unground; leguminous seeds, as beans, peas and cowpeas; oil cakes and other commercial by-products, as linseed oil cake, cotton-seed meal, gluten feed, and so on; fodder crops, fresh and cured; and the different roots, tubers and green vegetables. In quite recent times, cane molasses, beet molasses, and other beet sugar by-products have also assumed more or less importance in this connection. As regards feeding stuffs of animal origin, milk is the natural food of the young of all mammals. After weaning, skim milk is a common food, especially for pigs. Dried blood meal, and similar feeds of animal origin are also sometimes fed. The composition of a number of the more important feeding stuffs may be seen by reference to the subjoined table, which shows the average composition as determined by analysis and also the digestible nutrients furnished by each 100 pounds of the feeding stuffs.

TABLE I.—AVERAGE COMPOSITION OF A NUMBER OF FEEDING STUFFS.

KIND OF FEED	Percentage composition						Digestible materials in 100 pounds			Energy in 100 lbs. digestible nutrients
	Water	Protein	Fat	Nitrogen free extract	Crude fiber	Ash	Protein	Fat	Carbo-hydrates	
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	lbs.	lbs.	lbs.	Calories
Corn fodder.....	79.3	1.8	0.5	12.2	5.0	1.2	1.10	0.37	12.08	26,080
Kafir corn fodder	73.9	2.3	.7	15.1	6.9	2.0	.87	.43	13.80	29,100
Oat fodder.....	62.2	3.4	1.4	19.3	11.2	2.5	2.44	.97	17.99	42,000
Meadow fescue...	69.9	2.4	.8	14.3	10.8	1.8	1.49	.42	16.78	34,760
Timothy .....	61.6	3.1	1.2	20.2	11.8	2.1	2.01	.64	21.22	45,020
Ky. blue grass...	65.1	4.1	1.3	17.6	9.1	2.8	2.66	.69	17.78	40,050
Red clover.....	70.8	4.4	1.1	13.5	8.1	2.1	3.07	.69	14.82	36,100
Alfalfa .....	71.8	4.8	1.0	12.3	7.4	2.7	3.89	.41	11.20	29,800
Cowpea forage...	83.6	2.4	.4	7.1	4.8	1.7	1.68	.25	8.58	19,210
Corn silage.....	74.4	2.2	1.1	15.0	5.8	1.5	1.21	.88	14.56	33,050
Corn fodder, field cured .....	42.2	4.5	1.6	34.7	14.3	2.7	2.34	1.15	32.34	69,360
Oat hay.....	16.0	7.4	2.7	40.6	27.2	6.1	4.07	1.67	33.35	76,650
Timothy hay.....	13.2	5.9	2.5	45.0	29.0	4.4	2.89	1.43	43.72	92,730
Hay from mixed grasses .....	15.3	7.4	2.5	42.1	27.2	5.5	4.22	1.33	43.86	93,930
Red clover hay..	15.3	12.3	3.3	38.1	24.8	6.2	7.36	1.81	38.15	92,320
Alfalfa hay.....	8.4	14.3	2.2	42.7	25.0	7.4	10.58	1.38	37.33	94,940
Cowpea hay.....	10.7	16.6	2.9	42.2	20.1	7.5	10.79	1.51	38.40	97,870
Mangel wurzels ..	91.2	1.4	.2	5.4	0.8	1.0	1.03	.11	5.65	12,890
Turnips .....	90.6	1.3	.2	5.9	1.2	.8	.81	.11	6.46	13,990
Corn, unground..	10.9	10.5	5.4	69.6	2.1	1.5	7.14	4.97	66.12	157,220
Oats .....	11.0	11.8	5.0	59.7	9.5	3.0	9.25	4.18	48.34	124,760
Wheat .....	10.5	11.9	2.1	71.9	1.8	1.8	10.23	1.68	69.21	154,850
Cowpeas .....	14.8	20.8	1.4	55.7	4.1	3.2	18.30	1.10	54.20	139,490
Corn meal.....	15.0	9.2	3.8	68.9	1.9	1.4	6.26	3.50	65.26	147,800
Gluten meal.....	8.6	30.0	8.8	49.2	2.6	.8	21.56	11.87	43.02	170,210
Gluten feed.....	7.8	23.4	8.3	53.2	6.2	1.1	19.95	5.35	54.22	160,530
Brewers' grains, dried .....	8.0	24.1	6.7	44.8	13.0	3.4	19.04	6.03	31.79	119,990
Wheat bran.....	11.9	15.4	4.0	53.9	9.0	5.8	12.01	2.87	41.23	111,140
Wheat middlings.	12.1	15.6	4.0	60.4	4.6	3.3	12.79	3.40	53.15	137,000
Cotton-seed meal.	8.2	42.3	13.1	23.6	5.6	7.2	37.01	12.58	16.52	152,650
Cotton-seed hulls.	11.1	4.2	2.2	53.4	46.3	2.8	1.05	1.89	32.21	69,840
Linseed meal, new process .....	9.9	35.9	3.0	36.8	8.8	5.6	30.59	2.90	38.72	141,160
Sugar-beet pulp, fresh .....	89.9	1.0	0.2	6.3	2.2	0.4	0.63	....	7.12	14,420
Sugar-beet pulp, dry .....	6.4	10.8	1.3	58.4	19.8	3.3	6.80	....	65.49	134,460
Beet-sugar molasses .....	25.7	47.3	....	58.2	....	8.8	7.30	....	58.20	259,180
Cane-sugar molasses .....	25.1	42.4	....	69.3	....	3.2	3.20	....	69.30	298,400
Whole milk.....	87.2	3.6	3.7	4.9	....	0.7	3.48	3.70	4.77	30,870
Skim milk.....	90.6	3.2	0.3	5.2	....	0.7	2.94	0.29	5.24	16,439

a Largely non-albuminoid nitrogenous materials.

b Very largely sugars.

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It will be seen that the cereal grains resemble one another quite closely in composition, being characterized by a fairly low water content and a considerable amount of protein and nitrogen-free extract. Some crude fibre derived largely from the outer or bran layer of the grain is also present. Bran, shorts, middlings, and other by-products and cereal grains vary in composition, but all have a low water content while the crude fibre content is rather high, and the nutritive ingredients are principally protein and carbohydrates. The large proportion of crude fibre is due to the fact that these products represent the outer layers of the grain which are more hard and firm in structure than the interior portion which consists quite largely of starch. Beans, peas, and leguminous seeds resemble the cereal grains in having a low water content, though in general they furnish a higher percentage of protein. Such foods are known to be useful and valuable, but with the possible exception of cowpeas, they are not very commonly fed in the United States, although much used in Europe.

**Concentrated Feeds.**—The various cakes, gluten meals, and similar feeding stuffs are, generally speaking, commercial by-products. Thus, cotton-seed cake is the material left after the oil has been expressed from the cotton-seed. In the same way linseed cake is the residue obtained from flaxseed in the manufacture of linseed oil. When this is ground it becomes linseed meal. In the manufacture of beer the malted grain remaining is known as brewers' grains, and is best fed after drying. When starch is manufactured from corn, the nitrogenous portion of the grain is rejected and constitutes gluten feed and gluten meal. There are a number of mixed feeds on the market which are made up of shrunken grains, branny material, and other residues obtained in the manufacture of cereal breakfast foods, etc. These vary in feeding value, some of them comparing favorably with more common cereal feeds. Grain, ground and unground, commercial by-products, leguminous seeds, oil cakes and similar products are very frequently called concentrated feeds, the name being suggested by the fact that their feeding value, especially the protein content, is high in comparison with the bulk. So far as the general experience and the result of American and foreign experiments go, most of the common feeding stuffs in the group are wholesome and valuable. Some are more prized than others for a particular purpose. Thus, oats are a favorite food for horses, especially in the Eastern United States, and other regions where they are a staple crop, but in the South and Middle West, corn is the most important feed. For fattening cattle, sheep and hogs, corn is undoubtedly the most important grain in the United States.

**Forage Crops.**—The various forage crops—grass, clover, Kafir corn, corn, etc., all have a high water content when fresh, that is, they are more or less succulent and juicy. They contain, however, considerable nutritive material, chiefly protein and carbohydrates, and are valuable feeding stuffs. The leguminous forage crops—alfalfa, clover, cowpeas, soy beans, vetch, etc.—are richer in protein than the grasses. When forage crops are dried and cured the resulting hay is richer in proportion to its bulk than the green material; in other

words, it has been concentrated by the evaporation of the greater part of the water present. However, this is not the only change which has taken place. When hay is properly cured, it undergoes a peculiar sort of fermentation or oxidation materially affecting its composition, improving the hay by diminishing the quantity of crude fibre, and by increasing the relative amount of other nutrients, especially nitrogen-free extract. Hay which has undergone proper curing has a better flavor and agrees better with animals and is apparently more digestible than hay which has dried quickly in the sun without fermentation.

The feeding value of different forage crops, fresh and cured, depends in considerable degree upon the stage of growth, the nutritive value of the crop, generally speaking, increasing until the growth is complete and diminishing somewhat as the plants mature or become overripe. Straw, the fully ripened stalk of cereal grains contains some nutritive material, but is less nutritious than the same portion of the plant cut before ripening. In the perfectly ripe condition the nutritive material, elaborated in different portions of the ordinary forage plants, has been largely conveyed to the seed and used for its development or stored as reserve material.

**Silage.**—Green forage crops are frequently preserved by ensiling. In this process the material undergoes a peculiar oxidation which correspondingly changes it in composition and food value. Some of the carbohydrates are changed into alcohol, acetic and other acids, and crude fibre is undoubtedly softened somewhat and possibly the silage is thus rendered more digestible. Bodies having peculiar flavor and odor are also formed. The green crops, hay, straw and other cured crops and silage are frequently called "coarse fodder" or "roughage." This term is due to the fact that they contain a comparatively small amount of nutritive material and a high proportion of crude fibre as compared with their total bulk. Although inferior to concentrated feeds in composition, they are an essential part of the ration of farm animals, serving to give the required bulk to the food and being useful in other ways. It is believed that unless the food when taken into the stomach is comparatively bulky and the mass is more or less loose in structure, it is not readily acted on by the digestive juices.

The outcome of many experiments made with farm animals is in accord with the observation of careful feeders, namely: that the various common coarse fodders may be fed very largely as circumstances demand. Although timothy hay is regarded, in some regions, and corn fodder in others, as the best coarse feed, yet, experience has shown that both these feeds, and also hays from wheat, barley and other cereal grains, and from clover and alfalfa, are all of great value. Fresh herbage was, of course, the original food of domestic animals, and in early times, natural pasturage was almost entirely depended upon to support them during a considerable part of the year. The importance of pasturage is still conceded, but the fact is also recognized that if, owing to drought or other cause, the supply is insufficient, other food will be needed. When green feed is cut and fed fresh to farm animals, more or less confined, the practice is called "soiling" and is becoming quite prevalent, especially in older countries

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where land is expensive. It is coming into use in some localities of the Eastern United States to such an extent as to entitle it to recognition as one of the systems of feeding. Partial soiling is much more common, being relied upon to carry animals through the period when pastures are short. Under the soiling system, a larger number of animals can be kept upon a given acreage, and by allowing open air exercise in a large yard or pasture, the practice has been demonstrated as entirely feasible for dairying animals. On an average, carrots, Swedish turnips or rutabagas, and other roots and tubers, green vegetables, and fruits contain a high percentage of water and small amounts of the different classes of nutrients. The percentage of crude fibre is smaller than in the green forage crops; but since the proportion of nutritive material is small in comparison with the total bulk, they are ordinarily referred to as coarse fodder. The establishment of beet-sugar factories in this country has led to the production of immense quantities of sugar-beet pulp as a waste material, sometimes called "diffusion residue," or "beet chips," which consist of the residue of the beet after the extraction of the sugar under pressure in the diffusion batteries. Sugar-beet molasses is another product of the beet-sugar manufacture, which accumulates in large quantities, and both this and cane molasses are coming to be regarded as an important feed. It owes its value largely to the sugar in it.

**Preparing Feed.**—It is often claimed that cooking feed increases its palatability and digestibility. The general opinion drawn from experiments with farm animals is that this belief is not warranted and that the cost of cooking is not made up for by the increased value of the ration. Soaking feed, especially hard grain, renders it more easily masticated, and possibly increases its digestibility, but the general conclusion is that the importance of soaking feed for most farm animals is overestimated, although soaking wheat for pigs is quite generally recommended. Sprinkling or wetting dry hay lays the dust and is a practice often resorted to, particularly for horses, as the dust from dry hay, especially clover, is believed to cause heaves. Opinions differ as regards the advantages of grinding grain, but from the results obtained in a large number of tests with farm animals, it does not appear that the superiority of ground over unground grain is sufficient to pay for the cost of grinding, provided the animals have good teeth and sufficient time to chew their food thoroughly. Chaffed or chopped coarse fodder occupies less space for storage than uncut hay or straw and can be readily handled. Shredding corn fodder is an economical practice, and more of the stalks and harder portions will be eaten than when fed whole, but for most farm animals in general, the practice of cutting or chopping coarse fodder is much less followed in the United States than in Europe. Precaution should always be taken to avoid feeding stuffs which are harmful in themselves or which become harmful. Dirt, small stones, etc., should be removed from grain by proper screening and all feeding stuffs should be clean. Moldy feeds and those which are more or less decomposed are unwholesome, and may prove a cause of various diseases. Plants which are infested with ergot are also harmful. There are a number of plants which are poisonous to stock, such as

rattlebox (*Crotalaria sagittalis*), larkspur (*Delphinium* spp.), death camass (*Zygadenus venenosus*), water hemlock (*Cicuta* sp.), etc., and care should be taken to prevent animals from securing them. An explanation of the poisoning of stock by young sorghum and other green plants ordinarily wholesome, is offered by the discovery of a peculiar glucosid, which with the aid of a special ferment, also present in the plants, liberates prussic acid. This is doubtless always present in at least minute traces, but apparently becomes dangerous when the plant is arrested in dry weather at certain stages of its growth. Sunlight such as prevails in the arid and semi-arid regions of the United States sometimes causes the development of the poison in excess.

**Digestibility of Feeds.**—The real value of any feeding stuff is determined not alone by its composition, but also by its digestibility; that is, by the amount of material which it gives up to the body in its passage through the digestive tract. It is evident that if two feeding stuffs have practically the same composition, but one gives up more material to the body than the other—that is, is more thoroughly digested—it must actually be more valuable than the other material. The bulk of the substance of almost all feeding stuffs is insoluble when eaten. Only material in solution can pass through the walls of the stomach and intestines into the circulation and be utilized by the body; therefore, digestibility consists chiefly in rendering insoluble materials soluble. This is effected by the aid of digestive ferments and also to a less extent by bacteria. The usual method of ascertaining the digestibility of a given material is to feed it for a longer or shorter time, the amount and composition being determined. From the total nutrients consumed, the amounts excreted undigested in the feces are deducted, showing the amount of each retained in the body. It is the usual custom to express the amounts digested in percentages, the results thus obtained being termed coefficients of digestibility. As regards the results of digestion experiments with farm animals as a whole, it may be said that the percentage of protein digested is fairly high, being greater in grains and seeds than in hay or grasses. Generally speaking, the value obtained for the digestibility of fat is rather low, but there are reasons connected with the analytical methods commonly followed which render the results obtained with fat not altogether satisfactory. Nitrogen-free extract is quite thoroughly digested by farm animals, but crude fibre is not very thoroughly assimilated. Farm animals differ considerably as regards the thoroughness with which they digest their foods. It seems fair to say that in general, ruminants digest a larger percentage of fats, carbohydrates, including crude fibre, than horses, the difference being most marked in the case of the crude fibre. Pigs ordinarily digest their food quite thoroughly. These results are in accord with what might be expected from differences in the digestive organs of the different classes or animals.

**Food Requirements.**—Attempts have been made to ascertain the food requirements of various kinds of farm animals under different conditions, and large numbers of feeding experiments have been made under varying conditions with this end in view. From the results feeding standards have been deduced which show



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the amounts of digestible protein fat, and carbohydrates, supposed to be best adapted to different animals when kept for different purposes.

The feeding standards prepared by Wolff, a German investigator in animal nutrition, have been the most widely used of any. Wolff's standards have recently been modified by Prof. E. Lehmann, as the result of additional experiments and practical experience, and also in the attempt to adapt them more closely to the practical needs of the animal. A number of these standards are as follows:

TABLE II.—WOLFF-LEHMANN FEEDING STANDARDS.  
(Amounts of nutrients required per day per 1,000 pounds live weight.)

ANIMAL.	Total Dry Matter	Digestible Nutrients			Fuel Value
		Protein	Carbohydrates	Fat	
	Pounds	Pounds	Pounds	Pounds	Calories
Oxen at medium work.....	25	2.0	11.5	0.5	27,200
Oxen at heavy work.....	28	2.8	13.0	0.8	32,760
Fattening cattle:					
First period .....	30	2.5	15.0	0.5	34,650
Second period .....	30	3.0	14.5	0.7	35,500
Third period .....	26	2.7	15.0	0.7	35,900
Milch cows:					
Giving 11 lbs. milk per day.....	25	1.6	10.0	0.3	22,850
Giving 16.5 lbs. milk per day.....	27	2.0	11.0	0.4	25,850
Giving 27.5 lbs. milk per day.....	32	3.3	13.0	0.8	33,700
Fattening sheep:					
First period .....	30	3.0	15.0	0.5	35,600
Second period .....	28	3.5	14.5	0.6	36,000
Horses:					
Light work .....	20	1.5	9.5	0.4	22,150
Medium work .....	24	2.0	11.0	0.6	26,700
Heavy work .....	26	2.5	13.3	0.8	32,750
Fattening swine:					
First period .....	36	4.5	25.0	0.7	57,800
Second period .....	32	4.0	24.0	0.5	54,200
Third period.....	25	2.7	18.0	0.4	40,200

It should be borne in mind that feeding standards are simply a concise and approximate statement of the amounts of the different nutrients required by animals, as indicated by the results of experiments and observation, and are intended to apply to the average conditions. No single standard can be laid down for all conditions. Good judgment and intelligent observation on the part of the feeder are also necessary. The value of any ration which may be determined upon may be calculated with the aid of the feeding standards and the figures in Table I. Suppose four pounds of oats constitute one of the ingredients of a ration. According to the table, it is evident that if 100 pounds of oats furnish 9.25 pounds digestible protein, one pound will furnish .0925, and four pounds will furnish .3700. In the same way, if 100 pounds of oats supply 124,760 calories of energy, one pound will furnish 1247.60 calories and four pounds will furnish 4990.40. The sums of the protein supplied by all the feeds show the total amount in the ration, and so on, with all the other nutrients, and with the energy. In making such calculations, it is a common practice to consider only the protein and energy value since these factors show the essential features of the food and the calculation is somewhat simplified without materially lessening the value of the results. It is not necessary that a ration should furnish each day the exact amount called for by the standard but rather that it should approximate it through long periods, a slight deficiency at one time being made up by a corresponding excess at another. In

calculating rations it is essential that weights be used rather than measures. It is often inconvenient to weigh the grains, but the weight may be calculated with sufficient accuracy by the figures given below, which show the weight of a quart of a number of common feeding stuffs.

Some of these materials, especially by-products like wheat bran, vary considerably in weight, and the given figures cannot be regarded as strictly accurate. Weighing is, of course, always the safer way where it is desired to feed quite definite amounts. In selecting feeding stuffs for his stock, the farmer will naturally

be governed by the conditions of the market. The cost of feeding stuffs is controlled by other factors than the actual amounts of food materials which they contain; indeed, there often appears to be very little connection between the two. Bearing in mind that the protein is the most expensive ingredient, and the one especially sought in concentrated feeds, the farmer can make his selection with the aid of such data as are given in Table I. Of course, the special adaptability of some materials to different kinds of animals and different purposes will also be taken into account.

### WEIGHT OF FEEDING STUFFS PER QUART.

	lbs.	ozs.
Corn cracked .....	1	12
Corn meal .....	1	8
Corn-and-cob-meal .....	1	6
Oats, whole .....	1	12
Oats, ground .....	1	12
Wheat, whole .....	1	14
Wheat bran .....	1	10
Wheat bran, coarse.....	1	8
Wheat middlings .....	1	2
Wheat middlings, coarse.....	1	13
Gluten meal .....	1	11
Gluten feed .....	1	3
Linseed meal .....	1	2
Cotton-seed meal .....	1	8

Another important consideration where fertilizers or manures have to be relied upon is the manurial value of a feeding stuff. If the manure is carefully preserved a large proportion of the fertilizing constituents of the feed is recovered in the manure, and goes to enrich the land. (See FERTILIZERS.)

*Feeding Stuff Inspection.*—A number of dif-

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ferent States have passed laws requiring that the composition of certain classes of feeding stuffs be guaranteed by the manufacturer, and providing an inspection of these goods to see that the guaranty is complied with. These laws in general apply only to the so-called concentrated feeding stuffs, especially the by-products and mixed feeds, and not the cereal grains sold as such. The inspection is usually in charge of the Agricultural Experiment Stations; and is managed very similarly to the fertilizer inspection. The need for this inspection arises from the quite wide variation in the composition of many of the by-products, the confusion of names, as in the case of the by-products from starch manufacture, the large number of mixed feeds which are put upon the market under proprietary names, and the occasional tendency to mix with the material substances of inferior value. The feeding stuff inspection protects the farmer from fraud in the same way as the fertilizer inspection, and gives him the benefit of a guaranteed composition in buying. The result of this inspection, which has been in operation a number of years, has been quite marked in driving inferior grades of goods, like adulterated cotton-seed meal, out of the market, and tending to bring about greater uniformity in composition in the case of standard by-products.

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**Nutrition of Man.** To be properly nourished, man must be supplied at suitable intervals with the foods which will best serve to build the body, maintain it in health, and permit of the performance of the necessary amount of mental and physical work. Food may accordingly be defined as that which taken into the body, builds tissue, or yields energy. Blood and muscle, bone and tendon, brain and nerve, in fact, all the organs and tissues of the body, are formed from the nutritive ingredients of food, and with every motion of the body, and doubtless with the exercise of feeling and thought as well, some material is consumed which must be re-supplied by the food. If the food supply is just sufficient for the needs of the body, the weight remains constant, except for the daily fluctuations dependent upon the water consumed, contents of the intestinal tract, etc. If the food supply is insufficient, the body loses weight, while if more is consumed than is needed, reserve material, usually fat, is stored and the body gains in weight. In one sense, the body is a machine of a superior sort. Like other machines, it needs materials to build its several parts, to repair them when worn out and to serve as fuel. It uses this material like a machine in some ways, and in others differently. The engine gets its power from fuel and so does the body,—in the one case, coal or wood, and in the other, meat, bread, milk, etc., serving this purpose. In both cases, the energy latent in the fuel and called potential energy is transformed into heat and power. When coal is burned in a furnace, some of its potential energy is transformed into the mechanical power used by the engine for its work; the remainder is wasted in the heat not utilized by the engine. In a similar way, the potential energy of food is transformed in the body into heat, to keep the body warm, and into mechanical power employed for muscular work, but this is done more

economically than by the engine. If more heat is generated than is required, it is wasted, just as in the case of the engine. The human machine differs in one important particular from the steam-engine, namely, it is self-building, self-repairing and self-regulating. Then, too, if need be, the body can use its own substance, stored fat, for instance, as fuel, and the engine cannot. But besides all this, the body is more than a machine. It has not only organs to build and maintain, but has a nervous organization as well as sensibilities and the higher intellectual and spiritual faculties, and it seems fair to insist that the right exercise of these depends upon the proper nutrition of the body.

**Composition of Foods.**—The study of foods has shown that although they differ so much in texture and appearance, they are in reality made up of a few chemical constituents, namely, protein, fat, carbohydrates and ash, together with a larger or smaller amount of water. The latter can often be seen, as in the juice of fresh fruits or meat. In flour or dried beef, no water or juice is visible, but a small amount is contained in the tissues in minute particles, and may be separated in the laboratory. Protein is the name given to the total group of nitrogenous materials present. The group is made up mainly of the true proteids such as the gluten of wheat, the albumen of egg, etc., and nitrogenous materials such as amids which are believed to have a lower food value than the albumens.

The group "fat" includes the fat of meat, as suet and lard, the fat of milk (butter), true vegetable fats and oils like olive oil or the oil in corn, as well as vegetable wax, some chlorophyll (the green coloring matter in leaves, etc.), and other vegetable coloring matters, in brief, all the materials which are extracted by ether in the usual laboratory methods of estimating fat. The name "ether extract" is often and quite properly applied to this group.

The group "carbohydrates" includes starches, sugars, crude fibre, cellulose, pentosans, and other bodies of a similar chemical structure. This group is usually subdivided, according to the analytical methods followed in estimating it, into "nitrogen-free extract" and "crude fibre"; the former subdivision including principally sugar, starches, and most of the pentosans, and the latter cellulose, lignin, and other woody substances which very largely make up the rigid structure of plants. The carbohydrates occur chiefly in vegetable foods, though some are found in animal foods, milk-sugar being a familiar example.

The group "mineral matter" includes the inorganic bodies present in the form of salts in the juices and tissue of the different food, the principal chemical elements found being sodium, potassium, calcium, magnesium, chlorine, fluorine, phosphorus, and sulphur. The term "ash" is often and very appropriately used for this group, since the mineral matter represents the combustible portion which remains when any given food is burned.

Food, as we buy it at the market or even as served on the table, contains a large or smaller amount of material, which is not or cannot be eaten, and which would have little or no nutritive value if it were eaten, such, for instance, as the bones of meat and fish, the shells of eggs, and the skins and seeds of vegetables and fruits.

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In discussing the chemical composition of foods, such portions are usually spoken of as refuse, but they form an important item when the actual cost of the nutrients of food is considered. The materials grouped together as refuse contain the same ingredients as the edible portion, though generally in quite different proportions. Thus bones are largely mineral matter with a little fat and protein. Bran of wheat contains a large amount of crude fibre or woody material, with a little starch, etc. In some cases, material which is edible is classed as refuse because the flavor is objectionable. Thus peach or plum pits are too highly flavored to be palatable, and if eaten in quantity are undoubtedly actually injurious. The edible portions of food which are rejected in its preparation or at the table are spoken of as waste. The chemical composition of a food serves as a basis for judging of its value for building and repairing body tissue. Its value as a source of energy must, however, be learned in another way. The most usual way of measuring energy is in terms of heat, the calorie being taken as a unit. This is the amount of heat which would raise the temperature of 1 kilogram of water 1° C., or 1 pound of water 4° F. Instead of this, the unit of mechanical energy, the foot-ton (the force which would lift 1 ton 1 foot), may be used, but it is not as convenient. One calorie corresponds very nearly to 1.54 foot-tons.

**Fuel Value of Food.**—The fuel value of any food is equal to its heat of combustion less the energy of the excretory products derived from it, and may be learned by taking into account the chemical composition of the food, the proportions of the nutrients actually digested, and oxidized in the body, and the proportion of the whole latent energy of each, which becomes active and useful to the body for warmth and work. However, the fuel value may be and often is calculated from the composition of the food material supplied, on the assumption that 1 gram of protein furnishes 4 calories, 1 gram fat 8.9 calories, and 1 gram carbohydrates 4 calories, or one pound protein 1,820 calories, 1 pound fat 4,040 calories, and 1 pound carbohydrates 1,820 calories.

The relation between the quantities of nitrogenous and nitrogen-free nutrients in the ration is called the "nutritive" or "nutrient ratio." In calculating this ratio, 1 pound of fat is taken as equivalent to 2.25 pounds of carbohydrates—this being approximately the ratio of their fuel values—so that the nutritive ratio is actually that of the protein to the carbohydrates plus 2.25 times the fat.

All the organs and tissues of the body contain nitrogen. Protein is the only nutrient which supplies this element, and is therefore essential for building and repairing body tissues. The other elements required, namely carbon, oxygen, and hydrogen, may be supplied theoretically, at least, by protein, fat or carbohydrates; but a well-balanced diet should contain all the nutrients in proper proportion. Protein, fat, and carbohydrates may be burned with the formation of carbon dioxide and water, and therefore all may serve as a source of energy, but for protein this is the less important, and probably less usual function. The fats and carbohydrates by being themselves used as fuel, leave the protein for its indispensable work of

tissue forming. In an ordinary mixed diet, meat, fish and milk, among animal foods, and cereals among vegetable products, are the chief sources of protein. About nine tenths of the fat in the ordinary diet is supplied from animal foods, while approximately nine tenths of the carbohydrates are furnished by vegetable foods.

The mineral matter in food is required for a number of different purposes, a considerable amount being needed for the formation of the skeleton. Some is also present in the organs and tissues. It cannot, however, be regarded as a source of energy, according to commonly accepted theories, since it cannot be burned with the formation of carbon dioxide and water. The water present in the food is not a nutrient in the sense that it serves for building tissue or yielding energy, but it is essential, serving for carrying the food in the digestive processes, for diluting the blood, and for many other physiological purposes. The oxygen of the air is required by man as by all living animals for the combustion or oxidation of the fuel constituents of food.

The average composition of a number of common foods and the energy which one pound will furnish when burned in the body, are shown in Table I., on the following page.

It will be seen that meats, fish, eggs, milk, fresh vegetables, and fruits contain the most refuse and water; that protein is most abundant in the animal foods and in the dry legumes, and occurs in considerable quantities in the cereals; that fats occur principally in the animal foods; that carbohydrates are found almost exclusively in the vegetable products and milk; and that small quantities of mineral matter are found in practically all food material. The fuel value varies within wide limits, being greatest in those materials which contain the most fat and the least water.

**Digestibility of Foods.**—One of the most important considerations in fixing upon the value of any given food is its digestibility, in other words, the proportion of its nutritive ingredients which the body can retain and utilize. As frequently employed, the term digestibility has several other significations. Thus, to many, it conveys the idea that a particular food "agrees" with the user, in other words, that it does not cause distress when eaten. The term is also quite commonly understood to mean the ease or rapidity of digestion, and one food is called more digestible than another, because it is digested more easily or in less time. However, the term digestibility, as most commonly used in scientific treatises, refers to thoroughness of digestion. In brief, digestibility consists in rendering insoluble materials soluble, and is accomplished with the aid of digestive ferments and perhaps, though to a smaller degree, by micro-organisms. The principal digestive ferments are contained on the saliva, in the gastric juice of the stomach and the pancreatic juice of the intestine. The saliva has the power of changing starches into sugar. The gastric juice acts upon protein, and the pancreatic juice upon the protein, fat, and carbohydrates. Digestion is aided by fine division of the food in chewing, and by muscular contractions, that is, the so-called peristaltic action of the stomach and intestine, which helps to mix the digestive juices and their ferments with the

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TABLE I.—AVERAGE COMPOSITION OF SOME COMMON AMERICAN FOOD PRODUCTS.

FOOD MATERIALS (AS PURCHASED)	Refuse	Water	Protein	Fat	Carbo- hydrates	Ash	Fuel value per pound
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Calories
<b>ANIMAL FOOD.</b>							
Beef, fresh:							
Flank	10.2	54.0	17.0	19.0	....	0.8	1,105
Porterhouse steak	12.7	52.4	19.1	17.9	....	.8	1,100
Sirloin steak	12.8	54.0	16.5	16.1	....	.9	975
Rib rolls	....	63.9	19.3	16.7	....	.9	1,055
Corned beef	8.4	49.2	14.3	23.8	....	4.6	1,245
Veal: Breast	21.3	52.0	15.4	11.0	....	.8	745
Leg cutlets	3.4	68.3	20.1	7.5	....	1.0	695
Mutton: Leg, hind	18.4	51.2	15.1	14.7	....	.8	890
Loin chops	16.0	42.0	13.5	28.3	....	.7	1,415
Lamb, leg (hind)	17.4	52.9	15.9	13.6	....	.9	860
Pork, fresh:							
Ham	10.7	48.0	13.5	25.9	....	.8	1,320
Loin chops	19.7	41.8	13.4	24.2	....	.8	1,245
Tenderloin	....	66.5	18.9	13.0	....	1.0	895
Pork, salted, cured, and pickled:							
Ham, smoked	13.6	34.8	14.2	33.4	....	4.2	1,635
Salt pork	....	7.9	1.9	86.2	....	3.9	3,555
Bacon, smoked	7.7	17.4	9.1	62.2	....	4.1	2,715
Poultry:							
Chicken, broilers	41.6	43.7	12.8	1.4	....	.7	305
Fowls	25.9	47.1	13.7	12.3	....	.7	765
Turkey	22.7	42.4	16.1	18.4	....	.8	1,060
Fish:							
Cod, dressed	29.9	58.5	11.1	.2	....	.8	220
Mackerel, whole	44.7	40.4	10.2	4.2	....	.7	370
Shad, whole	50.1	35.2	9.4	4.8	....	.7	380
Shellfish:							
Oysters, "solids"	....	88.3	6.0	1.3	3.3	1.1	225
Lobsters	61.7	30.7	5.9	.7	.2	.8	145
Hen's eggs	11.2	65.5	13.1	9.3	....	.9	635
Dairy products:							
Butter	....	11.0	1.0	85.0	....	3.0	3,410
Whole milk	....	87.0	3.3	4.0	5.0	.7	310
Skim milk	....	90.5	3.4	.3	5.1	.7	165
Buttermilk	....	91.0	3.0	.5	4.8	.7	160
Cream	....	74.0	2.5	18.5	4.5	.5	865
Cheese, full cream	....	34.2	25.9	33.7	2.4	3.8	1,885
<b>VEGETABLE FOOD.</b>							
Flour, meal, etc.:							
Entire wheat flour	....	11.4	13.8	1.9	71.9	1.0	1,650
Graham flour	....	11.3	13.3	2.2	71.4	1.8	1,645
Wheat flour, patent roller process:							
High-grade and medium	....	12.0	11.4	1.0	75.1	.5	1,635
Low-grade	....	12.0	14.0	1.9	71.2	.9	1,640
Wheat breakfast food	....	9.6	12.1	1.8	75.2	1.3	1,680
Corn meal	....	12.5	9.2	1.9	75.4	1.0	1,635
Oat breakfast food	....	7.7	16.7	7.3	66.2	2.1	1,800
Rice	....	12.3	8.0	.3	79.0	.4	1,620
Tapioca	....	11.4	.4	.1	88.0	.1	1,650
Bread, pastry, etc.:							
White bread	....	35.3	9.2	1.3	53.1	1.1	1,200
Whole-wheat bread	....	38.4	9.7	.9	49.7	1.3	1,130
Crackers	....	5.9	9.8	9.1	73.1	2.1	1,875
Molasses	....	....	....	....	70.0	....	1,225
Honey	....	....	....	....	81.0	....	1,420
Sugar, granulated	....	....	....	....	100.0	....	1,750
Vegetables:							
Beans, dried	....	12.6	22.5	1.8	59.6	3.5	1,520
Beans, lima, shelled, green	....	68.5	7.1	.7	22.0	1.7	540
Cabbage	15.0	77.7	1.4	.2	4.8	.9	115
Corn, green (sweet) edible portion	....	75.4	3.1	1.1	19.7	.7	440
Lettuce	15.0	80.5	1.0	.2	2.5	.8	65
Onions	10.0	78.9	1.4	.3	8.9	.5	190
Peas, green, shelled	....	74.6	7.0	0.5	16.9	1.0	440
Potatoes	20.0	62.6	1.8	.1	14.7	.8	295
Sweet potatoes	20.0	55.2	1.4	.6	21.9	.9	440
Tomatoes	....	94.3	.9	.4	3.9	.5	100
Turnips	30.0	62.7	.9	.1	5.7	.6	120
Fruits, berries, etc., fresh:							
Apples	25.0	63.3	.3	.3	10.8	.3	190
Bananas	35.0	48.9	.8	.4	14.3	.6	260
Grapes	25.0	58.0	1.0	1.2	14.4	.4	295
Oranges	27.0	63.4	.6	.1	8.5	.4	150
Pears	10.0	76.0	.5	.4	12.7	.4	230
Raspberries	....	85.8	1.0	....	12.6	.6	220
Strawberries	5.0	85	.9	.6	7.0	.6	150
Fruits, dried:							
Dates	10.0	13.8	1.9	2.5	70.6	1.2	1,275
Figs	....	18.8	4.3	.3	74.2	2.4	1,280
Raisins	10.0	13.1	2.3	3.0	68.5	3.1	1,265
Nuts: Almonds	45.0	2.7	11.5	30.2	9.5	1.1	1,515
Chestnuts, fresh	16.0	37.8	5.2	4.5	35.4	1.1	915
Cocanuts	48.8	7.2	2.9	25.9	14.3	.9	1,295
Hickory nuts	62.3	1.4	5.8	25.5	4.3	.8	1,145
Pecans	53.2	1.4	5.2	33.3	6.2	.7	1,465
Peanuts	24.5	6.9	19.5	29.1	18.5	1.5	1,775
Walnuts, English	58.1	1.0	6.9	26.6	6.8	.6	1,250
Chocolate	....	5.9	12.9	48.7	30.3	2.2	5,625
Cocoa	....	4.6	21.6	28.9	37.7	7.2	2,160

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food. The digested food passes through the walls of the alimentary canal into the blood and then and later undergoes marked chemical changes. The heart pumps the blood containing the nutrients of the digested food, and the oxygen which it gets in the lungs, all over the body, and thus the organs and tissues are supplied with the materials which they need for their particular functions. At the same time, the blood carries away the waste which the exercise of these functions has produced. The living body tissue has the power of selecting the necessary materials from the blood and building them into its own structure, but just how it does this it is not possible to say.

The parts of the food which the digestive juices do not or cannot dissolve, and which therefore escape digestion, are periodically given off by the intestine. Such solid excreta, or *fæces*, include not only the particles of undigested food, but also the so-called metabolic products, that is, residues of the digestive juices, bits of the lining of the alimentary canal, etc. The other excretory products are the urine, respired air and perspiration.

The chemical elements of which this bodily waste is composed are, of course, the same as those making up the body and its food, namely, carbon, oxygen, nitrogen, calcium, etc. Most of the carbon and part of the oxygen are given off from the lungs as carbon dioxide. Hydrogen unites with some oxygen to form water, which is excreted in the form of vapor from the lungs, in the perspiration from the skin, and urine from the kidneys, which latter contains also nearly all the nitrogen, most of it in the form of urea. Waste mineral matters are given off to some extent in the perspiration but mainly through the kidneys and intestine. Although sometimes studied by methods of artificial digestion, the digestibility of any food may be most satisfactorily learned by actual tests, the method being, in general, the same as in experiments with animals. (See **NUTRITION OF FARM ANIMALS.**) From a large number of experiments, it has been calculated that on an average the different groups into which foods may for convenience be divided, have the following coefficients of digestibility:

cated experiments are frequently resorted to. Thus the income and outgo of nitrogen or nitrogen and carbon forms a means of judging of the processes which are going on in the body. Some of the most valuable experiments have been made with a special device called the respiration calorimeter (q.v.), which permits of the measurement of the total income and outgo of matter and energy.

The information gained from a study of the composition and nutritive value of foods may be turned to practical account by using it in planning diets for different individuals or classes of individuals or in estimating the true nutritive value of foods actually consumed by families or individuals, that is, by making dietary studies. The plan followed in making dietary studies which may be of any convenient number of days' duration, is as follows: Exact account is taken of all the food materials (1) on hand at the beginning of the study; (2) purchased during its progress; and (3) remaining at the end. The difference between the third and the sum of the first and second is taken as representing the amounts used. The amounts of nutrients and energy furnished by the total quantity of each food material are calculated through the aid of figures obtained from analyses of samples of the different foods or from tables of average composition like Table I. above. Deducting from the total amounts of the several nutrients and energy, the amounts found in the kitchen and table refuse, the quantities actually consumed are obtained. Account is also taken of the number of meals eaten by different members of the family or group studied and by visitors if there are any. From the total food eaten by all the persons during the entire period, the amount eaten per man per day can be calculated. Observation has shown that as a rule, a woman requires less food than a man and that young children require still less, the amount being dependent upon the age. The amount required by a person varies too with the amount of work performed, more food being evidently needed when a man is engaged at hard labor than when he is idle. The factors which are commonly used in computing the results of dietary studies follow; a man at moderately

TABLE II.—COEFFICIENTS OF DIGESTIBILITY OF NUTRIENTS AND THEIR FUEL VALUE PER POUND IN DIFFERENT GROUPS OF FOOD MATERIALS.

FOOD MATERIAL	Protein		Fat		Carbohydrates	
	Digestibility	Fuel value per pound	Digestibility	Fuel value per pound	Digestibility	Fuel value per pound
	Per cent	Calories	Per cent	Calories	Per cent	Calories
Fish and meats.....	97	1,940	95	4,040	98	1,730
Eggs .....	97	1,980	95	4,090	98	1,730
Dairy products.....	97	1,940	95	3,990	98	1,730
Animal food (of mixed diet)....	97	1,940	95	4,050	98	1,730
Cereals .....	85	1,750	90	3,800	98	1,860
Dried legumes.....	78	1,570	90	3,800	97	1,840
Sugars .....	..	....	..	....	98	1,750
Starches .....	..	....	..	....	98	1,860
Vegetables .....	83	1,410	90	3,800	95	1,800
Fruits .....	85	1,520	90	3,800	90	1,030
Vegetable foods (of mixed diet)...	84	1,840	90	3,800	97	1,820
Total food (of mixed diet).....	92	1,820	95	4,050	97	1,820

As a general rule, it may be said that carbohydrates are more completely digested than protein and fat, and that the protein of animal foods, as meat, milk, fish, and eggs is more digestible than that supplied by vegetable foods. In determining the value of food, more compli-

active muscular work being taken as the standard:

### FACTORS USED IN CALCULATING THE RESULTS OF DIETARY STUDIES.

Man at hard muscular work needs per meal or per day 1.2 the food of a man at moderately active muscular work.

## NUTRITION OF MAN

Man with light muscular work and boy 15-16 years old need, 0.9 the food of a man at moderately active muscular work.

Man at sedentary occupation, woman at moderately active work, boy 13-14, and girl 15-16 years old need 0.8 the food of a man at moderately active muscular work.

Woman at light work, boy 12, and girl 13-14 years old need 0.7 the food of a man at moderately active muscular work.

Boy 10-11 and girl 10-12 need 0.6 the food of a man at moderately active muscular work.

Child 6-9 years old needs 0.5 the food of a man at moderately active muscular work.

From results of many investigations and many physiological experiments, a number of so-called dietary standards have been suggested which are designed to show the amount of nutrients and energy which are required by persons of different occupations and habits of life. The European dietary standards proposed by Voit and the American standards proposed by Atwater, follow:

cooking. In the case of meat, a small part of the loss is due to the escape of meat juices and fat, but the chief loss is simply water. The material removed when meat is boiled need not constitute an actual loss if utilized as soup or gravy. In ordinary meat broth, the substances, with the exception of fat, which are dissolved out of the meat, bones and gristle by the water, consist almost wholly of extractives and salts, which are very agreeable and often most useful as stimulants but have little or no value as actual nutriment. In the case of vegetable foods also, the principal material lost in cooking is water driven off by the heat. If vegetables are boiled some sugar and mineral matter is almost always extracted, but such loss is too small to be very important. Heating often changes the structure of food materials very materially so they may be more easily chewed and more easily and thoroughly digested. In many vegetables,

TABLE III.—DIETARY STANDARDS.

INDIVIDUAL AND OCCUPATION	Actually eaten			Digestible			Fuel Value	Nutritive Ratio
	Protein	Fat	Carbo-hydrates	Protein	Fat	Carbo-hydrates		
	Gms.	Gms.	Gms.	Gms.	Gms.	Gms.	Calories	1 :
Man at hard work (Voit).....	145	100	450	133	95	437	3,270	4.9
Man at moderate work (Voit)....	118	56	500	109	53	485	2,965	5.5
Man with very hard muscular work (Atwater) .....	175	(*)	(*)	161	(*)	(*)	5,500	7.2
Man with hard muscular work (Atwater) .....	150	(*)	(*)	138	(*)	(*)	4,150	6.2
Man with moderately active muscular work (Atwater) .....	125	(*)	(*)	115	(*)	(*)	3,400	6.2
Man with light to moderate muscular work (Atwater) .....	112	(*)	(*)	103	(*)	(*)	3,050	6.1
Man at "sedentary" or woman with moderately active work (Atwater) .....	100	(*)	(*)	92	(*)	(*)	2,700	6.1
Woman at light to moderate muscular work or man without exercise (Atwater) .....	90	(*)	(*)	83	(*)	(*)	2,450	6.1

(\*) Fats and carbohydrates in sufficient amounts to furnish, together with the protein, the indicated amount of energy.

**Preparation of Food.**—The preparation of food has much to do with its nutritive value. Thus, many articles which, owing to their mechanical condition or other cause, are unfit for nourishment when raw, are nutritious and palatable when cooked. It is also a matter of common experience that well cooked food is appetizing and wholesome, while the same material if badly cooked is unpalatable. Cooking is of importance for at least three reasons: It changes the mechanical condition, so that the food material may be acted upon more freely by the digestive juices; it makes it more appetizing by improved appearance or flavor, or both; and it kills by heat disease germs, parasites or dangerous organisms if such be present. Food which is attractive to the taste quickens the flow of saliva and other digestive juices, and thus aids digestion. The cooking of meats develops the pleasing taste and odor of extractives and that due to the browned fat and tissues, and by softening and loosening the protein (gelatinoids) of the connective tissues, makes the meat more tender. Extreme heat, however, tends to coagulate and harden the albuminoids of the lean portions, and also to weaken the flavor of extractives. If the heating is carried too far a burned or charred product of bad flavor results. Quite generally foods lose weight in

the valuable carbohydrates, chiefly microscopic starch grains, are contained in tiny cells with comparatively thick walls on which the digestive juices have little effect. The heat of cooking, especially with the aid of water, ruptures these cell walls and also makes the starch more soluble. The heat also browns or caramelizes a portion of the carbohydrates and produces agreeable flavors in this and other ways.

In the case of breads, cakes, pastry, and other foods prepared from flour, the aim is to make a palatable and light porous food, more easily broken up in the alimentary canal than the raw materials could be. Sometimes this is accomplished simply with the aid of water and heat. In cooking, the heat changes part of the water in the dough into steam, which, in trying to escape, forces the particles of dough apart. The protein (gluten) of the flour stiffens about the tiny bubbles thus formed in the dough and the mass remains porous even after the steam has escaped. More commonly, however, other things are used to "raise" the dough—such as yeast and baking powder. The baking powder when wet gives off the gas carbon dioxide and the yeast causes fermentation in the dough by which the same gas is produced. This gas acts as the steam does, only much more powerfully. When beaten eggs are used to lighten dough, the



## NUTS

albumen encloses air in bubbles which expand, and the walls stiffen with the heat and thus render the food porous. Cleanliness should always be observed in keeping, handling, or serving food. This is required to insure health, as well as for other more obvious reasons. Cleanliness, in this sense, applies not only to freedom from visible dirt, but also from undesirable bacteria, etc.

**Cost of Food.**—Although the cost of food is one of the chief items in the living expenses of the large majority of the people, very few have any clear ideas regarding the actual nutriment in the different materials they purchase, and too frequently those who wish to economize have little knowledge of the combinations which are best suited to their needs and of the real nutritive value of different foods as related to their cost. In this connection, it is necessary to take into account not only the price per pound, quart or bushel of the different materials, but also the kinds and amounts of nutrients which they contain and their fitness to meet the demand of the body. The cheapest food is that which supplies the most nutriment for the least money, and the most economical food is that which is cheapest and at the same time most adapted to the needs of the hour. It is quite evident that the market price is not regulated by the actual food value. Thus, an ounce of protein or fat from the tenderloin of beef is not more nutritious than that from the round, although it costs considerably more. The attractive appearance of a given food or the buyer's fancy has much to do in regulating the demand and selling price. It is well worth while for housekeepers to become familiar with the true nutritive value of different foods, and to take this into account, as well as flavor, appearance and cost, in the selection of the daily menu.

**Diet.**—For persons in good health and with good digestion there are two important rules which should be observed in regulating the diet. The first is to select things which agree with the person and avoid those which experience has shown them they cannot digest without harm. The second is to choose such kinds and amounts of food as will supply the materials which the body needs and at the same time will not burden it with superfluous material which must be disposed of at the cost of health and strength. For guidance in this selection, Nature has provided us with instinct and taste which have been trained by experience. Physiological chemistry adds to these the knowledge, still new and not at all adequate, of the composition of food and the laws of nutrition. It is a common practice to be influenced too much by taste, or in other words by the dictates of the palate. Though there may be differences among abnormal persons, for the great majority of people who are in good health, the ordinary food materials such as meat, milk, butter, eggs, cheese, fish, flour, meal, sugar, fruits, potatoes, and other vegetables, make a fitting diet, the main question being to use them in such amounts and proportions as are suited to the actual needs of the body.

Too much food is as bad as too little, and entails a waste of energy as well as a waste of nutritive material. While in the case of some foods purchased, notably meats, more or less waste is unavoidable, the pecuniary loss can be

diminished, both by buying those kinds in which there is the least waste, and by utilizing more carefully than is commonly done, portions which are ordinarily classed as refuse. Then, too, much of the waste may be avoided by carefully planning the diet so as to provide a comfortable and appetizing meal in sufficient amount, but without excess. If strict economy is essential, the dearer cuts of meats and the more expensive fruits and vegetables should be avoided. With reasonable care in cooking and serving, a varied and pleasing diet can undoubtedly be furnished at moderate cost. It must be remembered that the real cheapness or dearness of a food depends not only on its market price, but also on the cost of its digestible nutrients, and that the ideal diet is that combination of foods which, while imposing the least burden on the body, supplies it with exactly sufficient material to meet its wants, and that the disregard of such a standard must inevitably prevent the best development of our powers.

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**Nuts**, hard-shelled fruits, indehiscent, with a hard, dry pericarp, growing on certain trees and bushes in most temperate and tropical regions. The shell, which is often enclosed by woody or leathery husks, does not open of itself when the nut is ripe. Common examples are hazel and hickory nuts. Peanuts and other ground nuts properly belong to another class of fruits. The more important nuts may be divided into two classes: (1) those used for food, and (2) those used for oil, dyeing, and other purposes, medicinal, ornamental, and commercial.

The principal kinds of edible nuts are sweet and bitter almonds (*Amygdalus communis*), native to Asia Minor, northern Africa, southern Europe, and successfully cultivated in California; Brazil-nuts, or nigger-toes, the seeds of a majestic tree (*Bertholletia excelsa*), whose habitat is Venezuela and northern Brazil; bread-nuts growing on a tree (*Brosimum alicastrum*) of Jamaica; several varieties of chestnuts, the American (*Castanea americana*) in the Eastern and Southern States, the Spanish (*Castanea sativa*) in southern Europe, northern Africa, and western Asia, also species found in Australia and Tahiti; cocoanuts, the fruits of the cocoanut palm (*Cocos nucifera*) in the East Indies, West Indies, Florida, South America, and Hawaii; cola, or kola, nuts, the seeds of a tree (*Cola acuminata*) native to West Africa and cultivated in tropical America; hazelnuts, filberts, or cobnuts (*Corylus avellana*) in England, Spain, Sicily, and other parts of Europe, also the American hazel (*C. americana*) and the California hazel; hickory nuts (*Carya alba* and other species) in the United States (from Maine to Texas), and Mexico; pecans (*Carya oliviformis*), in Indian Territory, Texas, Louisiana, and other southern States; pistachios or green almonds (*Pistacia vera*), found in southern Europe, southwestern Asia, and northern Africa; souari or suwarrow nuts (*Caryocar nuciferum*), also called the butternut of Demerara, native to Brazil and Guiana; walnuts (*Juglans regia*), commonly named English or Persian walnuts and Madeira-nuts, in Asia, Europe, Chile, and California, also the black

## NUTS

walnut (*J. nigra*) and the white walnut (*J. cinerea*) or butternut of the United States.

Certain edible nuts are used as sources of oil. The principal kinds are the almond (sweet and bitter), the ben nut of the East Indies, the candle nut of the South Sea Islands, the cashew-nut of the West Indies, the cocoanut of the East Indies, the dika nut of West Africa, the palm nut of West Africa, the pine nuts of Europe and Asia, the physic nut (*Curcas purgans*) of tropical America, the English walnut and the American butternut.

Of nuts having medicinal qualities are the seeds of *Strychnos nux-vomica*, of southern Asia and the East Indies, from which the poisonous drug nux-vomica is obtained, and the betel nuts, fruit of the areca palm (*Areca catechu*), in the East Indies and the Philippines, used as a vermifuge, also said to have stimulant and tonic properties. Some kinds of nuts are turned to account for various practical and ornamental purposes. The boomah nut (*Pycnocoma macrophylla*), of Africa, is used for tanning; nut galls (*Quercus infectoria*), of the Levant, for dyeing and ink-making; soap-nuts (*Sapindus saponaria*), of the West Indies, in washing. The horse chestnut (*Æsculus hippocastanum*), of Europe, contains starch. The cumara nut (*Dipteris odorata*), of Brazil, is valuable for its perfume. The sassafras nut (*Nectandra puchury*), of Brazil, is used in flavoring chocolate. Ravensara nuts, also called the Madagascar clove nutmeg, are useful for seasoning. Many species of nuts are prized as ornaments. Betel nuts are utilized as coat buttons; bladder nuts (*Staphylea pinnata*), of Central Europe, are worn as beads in necklaces; also the bonduc nut (*Guilandiera bonduc*), of India, and the grugru nut (*Acrocomia schlerocarpa*), of South America, are used as breads. The corozo nut or vegetable ivory, of Brazil and Colombia, is made into toys, and the coquilla nut (*Attalea funifera*), of Brazil, is valuable for decorative turnery.

The demand for nuts as an article of commerce is constantly growing. The value of nuts, domestic and foreign, annually marketed in the United States, is about \$7,000,000. The consumption of home-grown nuts cannot be accurately estimated. The yearly exports of domestic nuts amount to \$300,000, of which pecans (the most important of native nuts) form a considerable item. Imports during the fiscal year 1902-3 amounted to nearly \$5,000,000, the bulk being of three kinds: almonds (\$1,337,717), walnuts (\$1,106,033), and cocoanuts (\$908,242). The most popular varieties of almonds are from Tarragona and Ivica, Spain, and from Formigetta, France. Shelled almonds, which are largely used by confectioners, for the most part come from Spain, Sicily, and Italy. The walnuts from Grenoble, France, are said to be the best, and those from Naples have a fine flavor. Importations of cocoanuts are chiefly from South America and the West Indies. Of other nuts, filberts or hazels come principally from Italy, Sicily, and Spain, chestnuts from France and Italy, and Brazils from South America.

Recent experiments tend to show that the food value of nuts is much greater than was formerly supposed. Many savages and wild animals depend largely upon nuts for sustenance through long periods of the year. According to

a missionary of the Kongo, the natives subsisted almost entirely upon cola nuts during a famine lasting months. Among civilized people nuts have been looked upon as accompaniments to a feast, promoting cheerfulness and pleasant talk. They serve this purpose and more, for as sources of protein and fat they furnish considerable nutritive material and energy. Where other provisions are deficient in protein or albuminoids and fat, almonds and walnuts supply this lack. The chestnut may be used as a substitute for the cereals, because of its high proportion of starch, sugar, and dextrin. In some parts of Asia nut oil is used considerably in cooking.

Almonds, Brazilnuts, filberts, hickory nuts, pecans, walnuts, chestnuts, and other nuts contain in concentrated form a great deal of nourishment. When bought at ordinary prices, they should not be considered luxuries but fairly economical articles of diet. Investigations carried on at the Agricultural Experiment Station of the University of California in 1901-2 emphasize the fact that nuts are to be regarded as true foods rather than food accessories.

Samples are selected from Woods and Merrill's analyses of nuts. The edible portion of almonds contains: water, 6 per cent; protein, 23.5; fat, 53; carbohydrates, 7; ash, 3.9; fuel value per pound, 3,329 calories. Almonds are generally eaten as dessert, as is the Brazilnut, whose edible portion contains: water, 5.3; protein, 17; fats, 66.8; carbohydrates, 7; ash, 3.9; fuel value per pound, 3,329. The chestnut (Spanish, dry) contains: water, 6.6; protein, 9; fat, 6.6; carbohydrates, 75; ash, 2.8. The chestnut is widely grown in France, where large quantities are used as food by both poor and well-to-do classes. Dried chestnuts are ground to flour and baked in cakes. In Italy the chestnut is eaten fresh, boiled, and roasted, also in the form of porridge. Chestnut cake is a common delicacy among the peasants of the Apennines. In Korea the chestnut practically serves as a substitute for the potato, being cooked in several ways. In some countries chestnuts are used for fattening hogs and other animals. The edible portion of the filbert contains: water, 3.7; protein, 15.6; fat, 65.3; carbohydrates, 13; ash, 2.4; fuel value per pound, 3,432. The filbert is eaten chiefly as a dessert in England and America. In some countries of Europe it is often roasted, and it is sometimes ground to a flour and made into bread. It is grown in enormous quantities about Trebizond. The fruit of the shag-bark hickory is a great favorite with Americans. The edible portion of the hickory nut contains: water, 3.7; protein, 15.4; fat, 67.4; carbohydrates, 11.4; ash, 2.1; fuel value, 3,495. The pecan (*Hicoria pecan*) is the most popular of American nuts. The edible portion of the pecan contains: water, 3; protein, 11; fat, 71.2; carbohydrates, 13.3; ash, 1.5; fuel value per pound, 3,633. The English walnut ranks next to almonds in popularity. In Korea it is a regular article of diet. The edible portion of the walnut (Italian, *J. regia*) contains water, 4; protein, 16.9; fat, 68; carbohydrates, 9; ash, 2; fuel value per pound, 3,538. As there is practically no refuse in the composition of nuts, other food substances having bulk should be eaten with them. Vegetarians point to the lithe, active squirrel and recommend the eating of nuts for

reducing the abdomen and increasing agility. The fact that Americans do not appreciate the food value of nuts as much as Europeans and Asiatics do, is attributed to the abundance of fruits and cereals in this country. The increasing demand, however, is encouraging nut culture in California and other States. The number of nut-trees and their products in the United States as reported by the Twelfth census was as follows:

	Trees	
Almond .....	1,649,072	7,142,710 lbs.
Cocanut .....	48,919	145,000
Pecan .....	643,292	3,206,850 lbs.
Persian English Walnut...	726,798	10,668,065 lbs.
Miscellaneous nuts .....	834,460	380,224 bu.
Value of all nuts.....		\$1,959,161

Consult: A. Broadbent, 'Fruits, Nuts, and Vegetables,' U. S. Consular Reports, 1898, No. 219; C. D. Woods and L. H. Merrill, 'Nuts as Food,' 15th Annual Report Maine Agricultural Experiment Station, (1900); M. E. Jaffa, 'Further Investigations among Fruitarians,' etc., U. S. Dept. of Agriculture, E. S. R. No. 132 (1903); 'Reports Twelfth Census,' Vol VI. (1900); 'Nut Culture in the United States,' U. S. Dept. of Agriculture, Division of Pomology (1896); Parry, 'Nuts for Profit' (1897); Fuller, 'The Nut Cultivist' (1896).

EUGENE PARSONS,  
Author and Editor.

**Nutt, nüt, Alfred Trubner**, English folklore scholar: b. London 22 Nov. 1856. His education was obtained at University College School and the Collège de Vitry François, and after serving from 1874 a three-years' apprenticeship in the book publishing business on the Continent, succeeded to that of his father, David Nutt, in London, in 1877. He joined the Folk Lore Society soon after and was elected its president in 1897. He founded the English Goethe Society in 1886 and was one of the founders of the Irish Texts Societies in 1898. He has written 'The Legend of the Holy Grail with Especial Reference to the Hypothesis of its Celtic Origin' (1888); 'The Voyage of Bran' (1895-7).

**Nuttall, nüt'al, Thomas**, English-American naturalist: b. Long Preston, Settle, Yorkshire, England, 5 Jan. 1786; d. Nutgrove, near St. Helens, Lancashire, England, 10 Sept. 1859. He learned printing, came to the United States in 1807; traveled widely; made numerous discoveries in botany; ascended the Missouri River in 1811, the Arkansas in 1819, and in 1825-34 was professor of natural history and curator of the botanic gardens at Harvard. In 1834 he explored the Oregon and Upper California. From 1842 he resided in England. Among his publications were: 'The Genera of North American Plants' (1818); 'A Journal of Travels into the Arkansas Territory' (1821); 'Introduction to Systematic and Physiological Botany' (1827); 'A Manual of the Ornithology of the United States and Canada' (1834); and 'The North American Sylva: Trees not Described by F. A. Michaux' (1842-9).

**Nutting, nüt'ing, Mary Olivia**, American writer: b. Randolph Centre, Vt., 1 July 1831. She was graduated from Mount Holyoke Seminary (now College) in 1851, taught there 1853-70, was librarian of the institution 1870-1901, and since the last-named date, libra-

rian emeritus. She has published 'Steps in the Upward Way' (1867); 'Our Summer at Hill-side Farm' (1867); 'The Story of William the Silent' (1869); 'The Days of Prince Maurice' (1894); etc.

**Nux Vom'ica**, the popular name for the seeds of a tree (*Strychnos nux-vomica*) of the natural order *Loganiaceæ*. The tree is a native of Ceylon, Coromandel, and other parts of southern Asia. It is of medium size, bears oblong, entire smooth leaves, and flowers in terminal corymbs, followed by one-celled berries as large as oranges. They have brittle shells, white gelatinous pulp, and flat, disk-like hairy gray seeds which are tough, odorless, and very bitter. The pulp is a favorite food of many birds. The seeds have long been used in pharmacy and medicine, and are of great value, being the source of the alkaloids strychnin and brucin. Under the name false Angostura bark the bark of this tree has been used to adulterate the true Angostura bark, from which it differs in its properties.

**Nyack, ni'äk, N. Y.**, village in Rockland County; on the Hudson River, where the expansion is called Tappan Bay, and on a branch of the Erie Railroad. It is connected by ferry with Tarrytown on the opposite side of the Hudson, and it is about 26 miles from the Grand Central Station in New York. It was settled in 1700, incorporated as a village in 1873, gave up its charter in 1876, and was again incorporated in 1883. It is a beautiful residential village, but has some manufacturing. The chief industrial establishments are boot and shoe factories, wagon, carriage, and sleigh factory, yacht, boat-building, and cloth finishing works. For many years it has been an educational centre; it is the seat of the Nyack Military Academy, the Hudson River Military Academy, and the Rockland Military Academy. It has public and parish schools, a public library, and several good church buildings, notably Saint Ann's (R. C.), the interior of which is beautifully decorated. The village owns and operates the waterworks. Pop. (1910) 4,619.

**Nyam-Nyam, nyäm-nyäm', Niam-Niam**, or Zandeh, an African nation, composed of numerous petty tribes dwelling in the basins of the Shari and Welle rivers. They number upward of 2,000,000. They are a branch of the Sandeh tribes, who all belong to the stock of the negroid Nubas. The men devote themselves to hunting and war; the women cultivate the fields and eleusine, manioc, sweet potato, gourds, yam, banana, etc. These with game are the chief food, though a portion of the people are notorious cannibals. They have no cattle. Considerable manual and artistic skill is shown in the forging of iron, making of pottery and baskets, and the carving of wood. They are passionately fond of music, and play a kind of mandolin. Polygamy prevails. The weapons are spears, knives, a species of iron boomerang, and shields.

**Nyan, ni-än'**, a large wild sheep (*Ovis hodgsoni*) of the Tibetan Mountains, with great spiral horns on the head of the ram, and yielding excellent mutton. It is called argali by British sportsmen, and is one of the prizes of the chase in the Himalayan region.

## NYANGWE — NYMPHS

**Nyangwe**, nyāng'wě, Africa, a trading station in the Kongo Free State, on the Kongo River; lat. 4° 15' S.; lon. 26° 20' E. In 1871 it was visited by Livingston, and in 1876 Stanley made the place his headquarters while exploring the Upper Kongo. It is connected by road with Albertville on Lake Tanganyika. By caravan route, rivers, and steam cars from Leopoldville connections exist with the Atlantic.

**Nyanza**, nyān'zā, a Bantu word meaning "great water." It is used as the English word "lake" in connection with the names of three large bodies of water in Central Africa: as, Albert Nyanza, Victoria Nyanza, and Albert Edward Nyanza.

**Nyassa**, nyās'sā or nyās'sā (from the Bantu word *nyansa*, that is, "great water"), a lake in southeastern Africa, nearly 400 miles from the Indian Ocean, and west of German East Africa. It extends north and south about 350 miles, and east and west from 20 to 50 miles; area, about 14,300 square miles. It is about 700 feet deep at its southern point, but to north, or its source, it is quite shallow. Toward the south the bed sinks below the level of the Indian Ocean, and at its head the surface is over 1,000 feet above the ocean level. The outlet is Shiré River, which flows south into the Zambesi. With the exception of Murchison Falls and Rapids, 70 miles long, in the Shiré River, there exists unbroken water communication between the head of Nyassa and the Indian Ocean. The African Lake Company have launched steamers on the lake, investigated the coast, and made a road from the north end of the lake up the heights to the plateau between Nyassa and Tanganyika (q.v.). Another road has been made around the rapids in the Shiré River. On the west and east coasts are mountains, those on the east are from 4,000 to 11,000 feet in height. In some places low sandy land extends between the water and the mountain, and in other parts, as at the north, the mountains come down to the water. A number of rivers flow into the lake from the west; they have broken through the mountain barrier. Livingstonia (q.v.) on the south, Bandawé on the west, and a number of other small villages or hamlets have been established along the coast.

**Nyāya**, nyā'yā. See HINDUISM.

**Nyc'tipithe'cus**. See DOUROUCOULI.

**Nyd'ia**, a character in Bulwer's 'Last Days of Pompeii.' She is a blind flower girl, of good birth, rescued from slavery by the hero.

**Nye**, nī, Edgar Wilson, American humorist: b. Shirley, Maine, 25 Aug. 1850; d. near Asheville, N. C., 22 Feb. 1896. He removed when a young man to Wyoming Territory; studied law, and was admitted to the bar in 1876. Subsequently he made his home in New York and became widely known as a humorous lecturer and writer under the pseudonym of "Bill Nye." He was the author of 'Bill Nye and Boomerang' (1881); 'Forty Liars' (1883); 'Remarks' (1886); 'Fun, Wit, and Humor' (1889), with J. W. Riley; 'Comic History of the United States' (1894); 'Comic History of England' (1896); 'Baled Hay'; etc.

**Nyezhin**, nyě'zhēn. See NIZHAN.

**Nyiregyháza**, nyē-rěd-y-hā'zō, Austria-Hungary, town in the district of Szabolcs; on the Nyir River, and at the junction of two railroads, about 170 miles by rail northeast of Budapest. It is in a productive agricultural region in which wheat, grapes, and a variety of fruits grow luxuriantly. It is in the vicinity of the Tokay wine region. There are a number of manufacturing industries, among which are the manufacturing of matches, soda, and saltpeter.

**Nyköping**, nū'hē-pīng, Sweden, seaport, on a bay of the Baltic Sea; about 60 miles southwest of Stockholm. In the 13th century this was one of the most important places in Sweden. The castle, now a ruin, ranked in strength with those of Stockholm and Calmar. In 1719 the town was captured and nearly destroyed by the Russians. It has regular steamer communications with Stockholm and other ports, and is of considerable manufacturing and commercial importance.

**Nyl'ghau**. See NILGAI.

**Nym Crin'kle**. See WHEELER, ANDREW CARPENTER.

**Nymph**. See PUPA.

**Nymphaea'ceae**, an order of aquatic plants, the water-lilies. They are generally large, floating on the surface of the water, and having a stem which forms a subterranean creeping shoot. The flowers are very large, solitary, with cylindrical peduncles as long as the petioles of the leaves; the perianth is colored, petaloid, composed of a great number of petals, arranged in several rows, and often inserted, as well as the stamens, in the lower part of the sides of the ovary; the outermost of these petals seem to constitute a calyx, while those within form a kind of corolla. The stamens are very numerous; the anthers are turned toward the centre of the flower. The ovary is simple, covered almost throughout by the perianth-segments and by the stamens; it is globular, with several cells, each containing a great number of ovules; the stigma is radiated, peltate, sessile. The fruit is globular, resembling externally a poppy capsule, indehiscent, fleshy within, divided into a great number of cells containing seeds immersed in a fleshy pulp. This order furnishes one of the best examples of the gradual passage of petals into stamens and of sepals into petals; the transition is so insensible that many intermediate bodies are neither precisely petals nor precisely stamens, but part of both. The principal genera of the order are *Euryale*, *Victoria*, *Nymphaea*, and *Nuphar*. See LOTUS; VICTORIA REGIA; WATER-LILY.

**Nymphs**, in Greek mythology, youthful goddesses of inferior rank to the other divinities who dwelt in Olympus. Begotten by Oceanus, or by Zeus and others, they preserve and nourish the woods, rivers, springs, and mountains. They are therefore distinguished according to their offices, as Oceanides, nymphs of the ocean, regarded as daughters of Oceanus; Nereides, or nymphs of the Mediterranean, who were regarded as daughters of Nereus; Leimon- iades, or nymphs of the meadows; Dryades or Hamadryades, or nymphs of trees, whose lives were regarded as beginning and ending with those of the trees with which they were asso-

ciated; Melides, or nymphs of fruit-trees; Oreades or Orestiades, or nymphs of mountains and grottoes: these, dressed lightly, as huntresses, were the companions of Artemis (Diana), who was herself originally an Arcadian nymph; there were also Naiades, who presided over fountains, Potamides over rivers, and Limniades over lakes. The nymphs hold a middle station between gods and mortals, and, without being immortal, yet live longer than is permitted to man. At their death the substance which they have supplied with nourishing moisture perishes also. This first notion of nourishment, which is supposed in the very idea of a nymph, seems to have given origin to the second representation of them as nurses of young children entrusted to their care.

**Nyoro**, nyō'rō, a Bantu tribe living on the shores of Lake Albert Edward, in Africa. As a race they are well built, tall and good-looking. They live in cone-shaped, thatched huts and make dugout canoes and rafts. They lived principally on sweet potatoes, fish and game. They are said to number about 125,000.

**Nyrén**, nū-rän', **Magnus**, Swedish astronomer: b. Wermland, Sweden, 21 Feb. 1837. He was educated at Upsala and became an instructor in the Pulkova Observatory in 1868. His astronomical researches have been of great value and he was made vice-director of the Observatory at Pulkova in 1890. He has published: 'Bestimmung der Nutation der Erdschse' (1873); 'Variations de la latitude de Poulkova' (1893); etc.

**Nys'sa**, a genus of trees. See TUPELO.

**Nystag'mus**, involuntary motion of the eyeballs. The movement is usually lateral, but is sometimes rotatory, and in rare cases vertical. It may be induced by inflammation and other disorders of the eyes, and in miners is not infrequently caused by long-continued work underground in obscure light. Very little in the way of cure is possible.

**Nyx**, nīks, in Greek mythology, the goddess of night or darkness. She was the daughter of Chaos. Her brother was Erebus.

# O

**O** the fifteenth letter and the fourth vowel of the English alphabet. Its form may have been suggested by that assumed by the lips in producing the sound. It is called the labial vowel because of the part the lips have in its pronunciation: for analogous reasons the third vowel *i* (ee) is called the palatal and *a* (ah) the guttural vowel. In early Latin writing the *o* was square ◊. In the Greek alphabet there are two characters to represent this vowel, namely, great *o* (omega, Ω, ω) and little *o* (omicron, Ο, ο). The vowel sounds in our language which are represented by *o* are numerous, namely, (1) The sound it has in *oh*, *lo*, *cone*: this is the regular, long sound of *o*, and it is common to English with most other languages. Curiously, English seems to lack the short vowel sound corresponding to this long *o*: what is usually called the short *o*, the vowel sound in *on*, *odd*, *log*, is not the *o* of *lone* shortened, but rather the sound of *a* in *all* shortened. But though orthoepists hold that the true short open vowel sound of *o* is unknown in English, natives of New England almost invariably in many words shorten the open *o* (as in *go*) without changing its quality; in their pronunciation of *bone*, *home*, *coat*, *toad*, etc., the vowel is the true *o* shortened. This short *o* is not recognized by Alexander J. Ellis as an English vowel sound. The editors of Webster's Dictionary (edition of 1879) remark of this local pronunciation that "its rise and growth are interesting facts, and its final prevalence is a thing he (the theoretic phonologist) would rather desire than deprecate." The long *o* sound is variously represented in English; by *o* (*lo*), by *ow* (*low*), by *au* (*hautboy*), by *eau* (*beau*), by *eo* (*yeoman*), by *ew* (*sew*), by *oa* (*roam*), by *oe* (*hoe*), by *oo* (*door*), by *ough* (*dough*), by *ou* (*shoulder*), and by *owe*. (2) The vowel sound commonly called short *o*, as in *odd*, *cob*, is really, as we have seen, the shortened vowel sound represented by *a* in *all*, *fall*. (3) The obscure short vowel sound heard in *done*, *son*, *ton*; this sound is usually represented by *u*, as in *dun*, *sun*, *tun*. (4) The sound of *u* in *rune*, for example, *move*, *prove*. (5) The same sound shortened, as in *wolf*, *woman*; the vowel sounds 4 and 5 are the sounds of the fifth vowel in a standard alphabet. (6) The sound usually rendered by broad *a* in *all*, *call*: examples, *order*, *former*, *north*.

**O'**, in Irish proper names, a patronymic prefix corresponding to the Mac of the Highlands of Scotland; thus O'Connell means "the son of Connell." It is supposed to be a corruption of the Irish *ua* (Gaelic, *ogha*), meaning a grandson.

**O. P. Riots**, or **Old Price Riots**, a public disturbance in London in 1809, occasioned by the opening of the New Covent Garden Theatre. The management increased the prices of admission, and the crowd mobbed the theatre demanding that the old tariff for admission be retained.

**Oahu**, ō-ā'ho or ō-wā'hoo, one of the Hawaiian Islands, the northernmost large island of the group; length 38 miles, average width about 20 miles. It has an irregular coast line, several small harbors, one excellent harbor on the west coast, upon which Honolulu (q.v.), the capital of Hawaii is situated. Two mountain ranges cross the island, and between is a large dry plain which is productive when irrigated. Mount Kaala, 3,800 feet, is the highest point on the island.

**Oak**, a genus (*Quercus*) of trees and shrubs of the order *Cupulifera*. The species, of which there are about 300, are characterized by alternate simple deciduous or evergreen leaves, inconspicuous moncecious flowers, the staminate, usually in slender pendulous catkins, the pistillate usually nearly sessile and generally solitary or in groups of two or three and developing into "acorns" which are more or less globular or oblong nuts set in the hardened, scaly involucre (cups) which sometimes nearly surround them. Nearly all the species are natives of the northern hemisphere, especially the temperate and colder portions in the latter, of which even the larger species, when present, become reduced to mere shrubs, a peculiarity also exhibited in very sandy, dry or rocky soils. Some species are natives of the warmer parts of the temperate zone, but few are actually tropical. Most of the oaks are noted for strength, durability, longevity and striking individuality of appearance; and on account of these qualities they have been used as symbols by many races, and enter into literature and tradition. Some of the species reach maturity only when 50 to 100 years old, and others even exceed this maximum before reaching a size suitable for lumbermen's purposes. Specimens are known which have reached nearly 1,000 years, and others of half that age are common.

Oaks are generally propagated by seeds planted as soon as mature in the autumn; choice varieties are grafted or budded; and evergreen species are often increased by means of cuttings or layers. In general they thrive best upon well drained, fairly moist, loamy soils, especially such as are well supplied with lime. They are, however, found in all kinds of habitats, including almost pure sand, clay, rocky mountain sides and the mucky soils of undrained swamps. With few exceptions the valuable species are easily grown and readily transplanted while young.



## OAK APPLE—OAK GROVE

Among the oaks are some of the most valuable trees of the Temperate zone. Their acorns furnish a valuable food for swine, and in some instances are used for human food; their bark is one of the most important barks used in tanning; and their timber, which is noted for its solidity, strength, resistance to moisture, and durability, is one of the most important woods of the world. It is used largely in ship-building, but less now than before the introduction of iron and steel vessels; in railroad and mill construction, bridge building, etc.; and, because of its handsome graining and its ability to receive polish, it is extensively employed in interior finish of houses, in furniture, etc. The galls which grow upon certain species and the bark are widely used as a source of tannin for ink manufacture. Some of the more rapidly growing species are planted largely in Europe in copses, the stems being cut every few years for fuel and for the bark. Few trees are more highly prized by horticulturists and landscape gardeners; but usually the specimens must be in place before the gardener lays out the ground because with most species little effect can be expected under ten years. For this reason other trees of quicker growth are planted with oaks and are removed when the oaks need the space.

About 50 species and half as many hybrids and varieties are natives of the United States, some extending from Nova Scotia to Minnesota and southward to the Gulf States, others being limited to very restricted localities. In general these species belong to two groups, the black oaks and the white oaks. Those of the first group have leaves with pointed tips and acorns that require two years to reach maturity; those of the second have leaves with round lobes and acorns which reach maturity the first year. The most important species is probably the white oak (*Quercus alba*) which has the full range mentioned above. It attains a height of 100 feet, has broadly spreading branches which form an open rounded head, and the light gray bark which gives it its name. It is one of the handsomest of its genus, and being of rather quick growth for an oak, and remarkable for its stateliness, it is often planted in parks. Its timber being compact and remarkably handsome is one of the most prized for furniture. The mossy-cup or bur oak (*Q. macrocarpa*) resembles the white oak in size, appearance and distribution, but its timber, being of coarser grain, is less valued. The chestnut-oak (*Q. prinus*) is a smaller tree, with a broad irregular head and dark brown bark deeply furrowed, and with leaves like those of the chestnut. It ranges from Nova Scotia to Alaska and southward to southern Michigan, Ontario, and Pennsylvania. It is especially valued for its bark, which is exceptionally rich in tannin. The live oak (*Q. virginiana*) is a broadly spreading tree, seldom more than 60 feet tall. It is noted throughout its range, which extends from Virginia southward, for its glossy, dark green leaves and its dense shade, for which it is widely planted in the South for ornament. It is usually draped with Spanish or Florida moss (*Tillandsia*) which also adds to its striking appearance. The red oak (*Q. rubra*) which has a range similar to the white oak, is a rapidly growing, handsome tree sometimes reaching 150 feet and forming a broad round head. Its timber is very heavy, durable and hard, but is coarse-grained. It is

less used for the finer work than the white oak. A close relative, the scarlet oak (*Q. coccinea*), is smaller than the preceding, but is similar in range, uses, etc. Both kinds are remarkable for their autumn colors. The water-oak (*Q. nigra*, popularly known as *Q. aquatica*) is common from Delaware southward to the Gulf States. It attains a height of 80 feet, and being of rapid growth it is frequently planted as a street tree in the South. In the North it is not hardy.

The European or British oak (*Q. robur*) has two well marked botanical varieties, one with stemless acorns, the other with acorns on stems. It is a native of western Asia and northern Africa as well as of Europe. About 50 horticultural varieties of this species are in cultivation for ornament, some being introduced into America for this purpose. This is the oak of legendary lore, under whose branches the ancient Druids held their religious ceremonies. It is also the oak used by the navies of Europe for more than a thousand years. The cork-oak (*Q. pseudo-suber*) is a native of the Mediterranean region and is noted for its bark which furnishes the cork of commerce. The gall-oak (*Q. lusitanica*) is a shrub, native to western Asia, and is chiefly useful for its nut-galls (q.v.) which occur upon the leaves as the result of insect attack. The Valonia oak (*Q. ægilops*) common in the same region, is noted for the astringency of its acorns, which are largely used in tanning. The holm, holly or evergreen oak (*Q. ilex*) is a native of southern Europe, and bears acorns used for food.

A very large number of insects live upon the oak, its timber and its decaying wood. One estimate for the United States places this at 1,000; the number actually recorded being between 500 and 600. In Germany, according to Kaltenbach, there are 537. These belong to all orders and include borers, leaf-chewers, sap-suckers, and fruit-eaters. Among the most noted are the oak-tree pruner (*Elaphidion villosum*), a beetle which lays its eggs in the twigs, in the pith of which the larvæ feed until nearly mature, when they chew out a ring of wood nearly to the bark, retire to the semi-severed twig, plug up the burrow and pupate. The wind snaps the twigs; hence the name. Many gall-forming insects, plant-lice, leaf-miners, scale-insects and leaf rollers, feed upon the leaves, which are also often attacked to a damaging extent by the larvæ of numerous lepidopterous insects. Some of the curculios are frequent pests upon the acorns, which are rendered useless for stock food, because their contents have been eaten by the larvæ. Perhaps the most serious pests, however, are the borers, of which there are a large number. These may retard the development of the trees or may so injure the wood by their burrows as to make it unfit for purposes where strength and appearance are necessary. Consult: Packard, 'Fifth Report, United States Entomological Commission' (Washington, 1890).

**Oak Apple**, any large gall (q.v.) on an oak; specifically, in England, a spongy excrescence on the twigs of *Quercus pedunculata*.

**Oak Crown**, Order of the. See ORDERS AND DECORATIONS.

**Oak Grove, Battle of**. After the battle of Fair Oaks or Seven Pines (q.v.) 31 May-1 June 1862, Gen. McClellan remained inactive

astride the Chickahominy, his advance but five miles from Richmond. In the last week of June Fitz-John Porter's corps of two divisions; with McCall's division, temporarily attached, was on the left bank of the Chickahominy, and held the right of the line. Next on the left, across the stream, was Franklin's corps of two divisions, and on Franklin's left, in the order named, Sumner's and Heintzelman's corps, of two divisions each. Keyes' corps, of two divisions, was in reserve. The effective strength of the army was 92,500, and McClellan was daily calling for more. Lee, including Jackson's command, which was near, stood between him and Richmond with 80,000 men. The bridges being repaired and the ground firm, McClellan, 25 June, determined to advance the left of his picket-line preparatory to a general forward movement. Immediately in front of the most advanced redoubt on the Williamsburg road was a large open field, beyond which was a swampy belt of timber of some 500 to 700 yards, which had been disputed ground for many days. Further in advance was an open field, crossed by the Williamsburg road and the railroad, and commanded by a Confederate redoubt and rifle-pits. It was McClellan's intention to push his lines through these woods in order to ascertain the nature of the ground, and to place Heintzelman and Sumner in position to support an attack to be made by Franklin on the 26th, on the rear of Old Tavern, and which, if successful, would force Lee from the heights overlooking Mechanicsville and clear the way for a general advance on Richmond. The movement began about 9 A.M. by the advance of Hooker's division of Heintzelman's corps on both sides of the Williamsburg road, where a mile separated the Union and Confederate works. Hooker was supported by Kearny's division on the left, and on the right by Richardson's division of Sumner's corps. The Confederate pickets were driven in, and Hooker struck Wright's and Armistead's brigades of Huger's division, which, with a part of Ransom's brigade, made a stubborn resistance, and at 11 A.M., after Hooker on the right had advanced some 800 yards and Kearny nearly a mile, the entire Union line was ordered to fall back; Kearny, however, held on to the ground won. At 1 P.M. McClellan came upon the field and ordered a renewal of the advance. Hooker was reinforced by a brigade of Couch's division, and advanced; Kearny joined in on his left. Mahone's brigade and the rest of Ransom's reinforced the Confederates, and a severe fight ensued, lasting until dark. McClellan says he accomplished his object. The Confederates claim that McClellan was repulsed and gained no material advantage, and that at night they occupied their old positions. This battle, also known as that of Kings school-house, French's Fields, and the Orchards, was the beginning of the Seven Days' Battles (q.v.). The Union loss was 67 killed, 504 wounded, and 55 missing. The Confederate reports show a total loss of 441. Consult: 'Official Records,' Vol. XI.; Webb, 'The Peninsula'; Allan, 'History of the Army of Northern Virginia'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. II.

E. A. CARMAN.

**Oakeley**, **SIR Herbert Stanley**, English composer: b. Ealing 22 July 1830; d. November

1903. He was educated at Rugby, and at Christ Church, Oxford, studied music in England and at the Leipsic Conservatory under Moscheles and Plaidy, and later devoted himself to the organ, working with Breidenstein in Bonn and with Schneider in Dresden. In 1858-68 he was musical critic to the 'Guardian,' in 1865-91 professor of music at Edinburgh, and for many years composer to the Queen in Scotland. In Scotland he furthered orchestral and organ music, and established Students' Choral Associations in the universities. His compositions are principally religious, including anthems, cantatas, hymn tunes, chants, and service-music; but he also wrote some pieces for the piano-forte.

**Oaken Crown, Order of the.** See **ORDERS, ROYAL.**

**Oakes**, ôks, **Urian**, American colonial scholar and clergyman, 4th president of Harvard College: b. England 1631; d. Cambridge, Mass., 25 July 1681. He was brought to America in 1634, showed himself an able mathematician and astronomer when a mere boy, was graduated at Harvard in 1649, studied theology, preached for several years in England, and in 1671 became pastor of the church in Cambridge and fellow of Harvard College. His ambition is supposed to have urged him to rouse dissension against President Hoar, upon whose resignation in 1674 he became acting president, being inaugurated in 1680. He wrote much Latin verse and a famous 'Elegy upon the Death of Thomas Shephard,' selections from which may be found in Tyler, 'History of American Literature.'

**Oakland**, ôk'land, Cal., city, county-seat of Alameda County; on the San Francisco Bay, and on the Southern P., the Santa Fé, and the Western P. R.R.'s; across the bay from San Francisco, and at the centre of the coast-line of the State. It is connected by the electric railway system with the chief towns and villages of the county, and with a number of places along the coast. The land-locked harbor, six miles along the southern front of the city, can accommodate the largest ocean vessels. The city has 15 miles of water-frontage. The jetties erected by the Federal Government in the western part of the harbor have greatly increased traffic. The high-tide jetties, forming the harbor entrance, are built of rubble stone. The South Pacific Coast Railway has built a solid mole alongside the south jetty.

Oakland is walled on the north and east by the Coast Range, and the city slopes down to the bay, making a location of great scenic beauty, forming an almost perfect natural drainage, and so protecting the city from cold but not cool breezes as to give an ideal climate. The mean temperature for the years 1880 to 1904, was 52° F. It was settled in 1820 by Don Luis Maria Peralta and other Spaniards, was incorporated in 1852, and chartered as a city in 1854. It is the commercial centre of a large agricultural region, and its excellent facilities for transportation (ships and cars meet at the water-side) are greatly increasing the amount of its shipments each year. Its chief industrial wealth is derived from its manufactures, shipping, and the agricultural products of the county. The principal industrial establishments are iron works, which have 800 employees; ship-

building works, 700 employees; canneries, over 4,000; flour mills, 150; candy factories, 200; gas works, 250; planing mills, 650; and lumber yards, 375. There are in the employ of building contractors over 2,000 men; the paving companies have about 350 employees; the coal and grain handlers number about 175, and the water company has 250 employees, the street railroads, 900; and other industries of the city have in all 17,941 employees. The annual wages paid to the employees of industrial establishments is about \$10,302,000. Some of the prominent buildings are the post-office, banks, hospitals, Home for the Blind, Y. M. C. A. and Y. W. C. A. buildings, theatre, Saint Joseph's Home for Deaf Mutes, the church, school, and library buildings. The educational institutions are 19 public and 10 parish schools, California College (Baptist), Saint Mary's College (R.C.), Saint Joseph's Academy (R.C.), Our Lady of Lourdes Academy (R.C.), a public library which contains nearly 40,000 volumes and is housed in a Carnegie building which cost \$50,000, on a site that cost \$20,000. Connected with the public high school is a well equipped observatory. Berkeley (q.v.), which is the seat of the University of California, adjoins Oakland, on the north. There are eight public parks, and a water park in which at the base of the foothills and within 10 minutes' walk of the centre of the city is Lake Merritt, a natural salt-water lake of 170 acres, whose waters are replenished with every tide. The nine banks have a combined capital of over \$3,000,000 and deposits of over \$25,000,000. In August, 1911, Oakland was one of eight cities in California having commission government. Berkeley on the north, Alameda on the southwest, and a number of smaller adjoining places are practically one with Oakland commercially, but each has a separate municipality. Pop. (1880) 34,555; (1890) 48,682; (1900) 66,900; (1910) 150,174.

EDWIN STANTON,

*Secretary Oakland Board of Trade.*

**Oak'um**, in shipbuilding, threads of hempen ropes picked to pieces, to be used when mixed with pitch for calking the seams of wooden vessels. Until recently old men, women, and children were employed to pick oakum, but this is now chiefly done by machinery. The rope or junk is old rigging and cables bought up for this purpose. It is first cut by a powerful knife into short lengths, and these are thoroughly steamed to dissolve out the tar. The strands being then pulled apart, they are spread in the sun to dry. After this they are torn in pieces and cleaned of dust in carding machines, a succession of which are used, until the oakum is obtained in clean light fibres. Since the passing of the wooden ship, oakum is very little in demand.

**Oannes**, ō-ān'nēz, in Babylonian mythology, a god of the sea, described as having the head and body of a fish, to which were added a human head and feet. In the daytime he lived with men to instruct them in the arts and sciences, but at night retired to the ocean.

**Oar Fish**, or **Band-fish**, one of the ribbon-fishes (*Regalecus banksii*), a peculiar deep-sea fish, 12 to 20 feet or more in length, with a narrow and extremely compressed body of a silvery color. It is only rarely met with and

usually in a dying condition, as its proper home is in the depths of the sea.

**Oás**, ō-ās', Philippines, a pueblo of the province of Albay, Luzon, situated in the Inaya River, 15 miles northwest of Albay, the provincial capital. It is on the main road between Ligao and Polangui, has a considerable river trade, and is the centre of one of the finest hemp-growing districts of the province. Pop. 15,987.

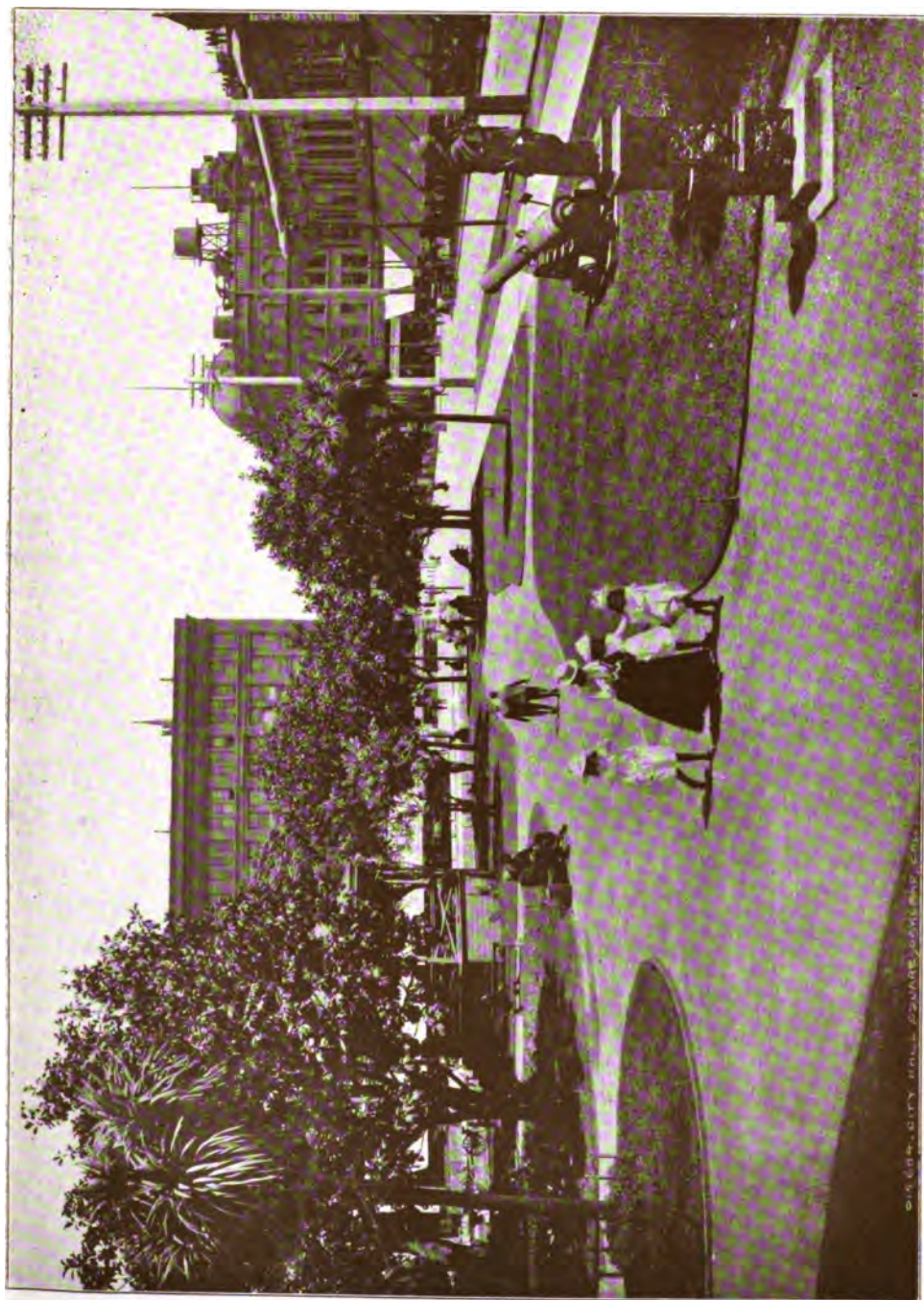
**Oa'sis**, a fertile place in a desert, usually found where lack of vegetation is caused by lack of moisture. Some of the mountains in the Sahara are of sufficient height to cause condensation of moisture and rainfall; and as much of the soil has all the ingredients necessary for productiveness, an oasis is formed. Springs sending out enough water to moisten the soil aid in the formation of fertile spots; and artificial means are now used; the artesian wells are assisting in making productive places in the Sahara. See SAHARA.

**Oat Grass**. See GRASSES OF THE UNITED STATES.

**Oates**, ōts, Titus, notorious English perjurer, the fabricator of the story of the Popish Plot: b. Oakham 1649; d. London 12 July 1705. The son of a clergyman of the Church of England who had become an Anabaptist preacher and in 1654 was expelled from a chaplaincy in the Parliamentary army, he was turned out of successive schools and took no degree at Cambridge, but was ordained and became vicar of Babbing in 1673. Soon after he was vicar to his father, with whom he circulated such outrageous stories against a schoolmaster of the parish that they were expelled from the living. After various ups and downs, about 1676 he conceived the idea of informing against the Roman Catholics; he became a Roman Catholic in 1677, studied at Valladolid and St. Omer, but was expelled from both, and 1678 gave information as to a Popery Plot against Charles II., intended to seat upon the throne James, Duke of York, and turn the country over to the Jesuits. He received a large governmental pension and his story was implicitly believed, resulting in the judicial murder of 35 innocent persons. But in two years the excitement somewhat subsided; and upon the accession of James II., Oates' pension was withdrawn and he was put on trial for perjury, was found guilty, fined, condemned to stand in a pillory, and be imprisoned for life after a terrible flogging, which he survived as by a miracle. His sentence was reversed after the accession of William and Mary; he was set free and received an annual pension of £300. In 1693 he married a rich widow and a few years later joined the Baptist congregation and preached among them, but was soon expelled. Consult: Roger North, 'Examen,' and 'Lives of the Norths'; Thomas Seecombe, 'Lives of Twelve Bad Men' (1894); Burnet, 'History of My Own Time' (1883); and the English histories of Hallam, Lingard, and Macaulay.

**Oaths and Affirmations (Judicial)**. A judicial oath is a solemn declaration made in some form warranted by law, before a court of justice or some officer authorized to administer it, by which the person taking it promises to tell the truth, the whole truth and nothing but the truth, in relation to his knowledge as to the matter then under consideration, and appeals to God to wit-

OAKLAND.



CITY HALL SQUARE.





## OATS—OAXACA

ness his sincerity. It is distinguished from an extra-judicial oath in the fact that the latter is not made under any warranted form of law, and has no binding force, except in the conscience of the one taking the oath. An affirmation is made in place of an oath by a person conscientiously opposed to an oath, and it is a declaration which is equivalent in law to an oath. Oaths are of extremely ancient origin, and are not peculiar to Christianity, having been used by nearly all nations in the world. Affirmations in place of oaths were the result of a statute first enacted in England for the benefit of those to whom the invocation of the Deity was objectionable. Generally under the present laws, only those persons included within the statutes permitting an affirmation to be made in place of an oath, have such right. Authority to administer oaths is an incident to judicial officers. All persons having sufficient intelligence to appreciate the nature of an oath and believing in the existence of a Supreme Being, who demands a moral obligation to speak the truth when under oath, are competent to take an oath.

In nearly all of the United States, through statutory enactment, it is provided that every person believing in a religion, not the Christian religion, may be sworn according to such ceremonies as his religion may have; a substantial compliance with the provisions of the statute as to the form of an oath is usually sufficient, the test generally being as to whether or not the person taking the oath would be liable for punishment for perjury in the event that such oath had been violated. Any person lawfully required to depose the truth, and making a wilful false oath on any material point, whether he believes it or not, is subject to be held for perjury, and punishment therefor in accordance with the statutes under which he may be indicted. See also EVIDENCE; LAW, CRIMINAL; WITNESS.

**Oats**, various grasses of the genus *Avena*. The best known species is often subdivided into Tartarian oats (*A. orientalis*) and common oats (*A. sativa*). In the former variety the panicles are one-sided and somewhat contracted; in the latter they are loose and spreading. The origin of common oats is in doubt, but many writers suppose that they are derived without hybridizing from a Tartarian species now unknown to botanists. The numerous varieties of this species vary greatly in color, size of grain, height, etc., and more or less in composition. Other species are cultivated to a small extent but are mostly considered weeds. The best known of these are probably animated oats (*A. sterilis*) whose seeds move with varying amounts of moisture; wild oats (*A. fatua*) valued in some places, for example, California, for pasturage, but generally regarded as a noxious weed; bristle-pointed oats (*A. strigosa*) used sometimes like the preceding but also considered a weed; and short oats (*A. brevis*) cultivated at high altitudes for its seed which matures where other cereals fail.

Oats succeed well upon a great variety of soils if these are well supplied with moisture. They will not do well in wet soil nor in hot countries, though in warm regions they succeed if the soil is moist enough. They thrive best in temperate climates, in many of which they

rank as one of the most important cereal crops. The land is plowed and harrowed usually in spring and the seed either sown broadcast or drilled in at the rate of about three bushels to the acre. In the western United States the seed is commonly sown broadcast upon cornland which has been prepared only with the harrow. In the eastern States the ground is usually plowed previous to sowing. Since the plants are very hardy the seed may be sown as soon as the ground can be worked in spring, a practice which insures an early development of the plants under favorable conditions. In about three months the harvest usually occurs in northern countries; in southern regions a somewhat longer time is necessary because of the shorter days and usually drier conditions. Though the average yield per acre in the United States was, during the last decade of the 19th century, 26.14 bushels, yields of more than 50 bushels are common under good management, especially in Europe.

Oats are rather exempt from the attacks of specific insect enemies; and the means of combating the general cereal enemies are the same as for wheat, barley and other grass and grain insects. They are subject to the attacks of several so-called plant diseases, of which the best known are rust and smut. Since these are less troublesome upon early maturing varieties, these are chosen in regions which seem to be infested. They also have another advantage in that they are less likely to lodge than taller and later growing varieties.

The oat has long been considered one of the most valuable of cereal grains. Treated as a grass it makes an excellent forage, fodder or hay; and as a grain it is one of the standard feeds for domestic animals, particularly the horse, and is widely used as human food, especially for making porridge. In the manufacture of what are called "breakfast foods" the oat takes an important part, and the by-products, such as hulls (the outer covering), bran, middlings, and "oat dust" are largely sold to stockmen for mixing with other feeds. The whole grain has the following average composition: Nitrogen-free extract, 59.7; protein, 11.8; water, 11.0; crude fibre, 9.5; fat, 5.0; ash, 3.0. Since analyses have failed to reveal the presence of a supposedly stimulating principle called "avenin," chemists and other investigators have concluded that such a principle does not exist.

Consult Morrow and Hunt, 'Soils and Crops of the Farm' (1892), and books upon general farming.

**Oaxaca**, wā-hā'kā, **Oaxaca de Juarez**, dā hoo-ā'rēth, or **Oajaca**, Mexico, a maritime state, bordering on the Pacific Ocean, and bounded on the north, east, and west by the states of Puebla, Vera Cruz, Chiapas, and Guerrero. Area about 28,778 square miles. The principal mountain ranges are the Sierra Madre, which crosses the whole state, and Sierra del Sur, near the coast. See MEXICO—THE STATES OF.

**Oaxaca**, Mexico, city and capital of the State of the same name. The situation, in the midst of a fertile valley, the rivers Atoyac and Jalatlaco flowing through it out into the Oaxaca valley, is most attractive. It is 288 miles southeast of Mexico City, by railway, and is



5,067 feet above sea level. It enjoys an unlimited supply of pure water, by means of two aqueducts, one of which was built in 1755 and the other in 1880. Transportation facilities are supplied by the Mexican Southern and Oaxaca & Ejutla railways. There is a local bank,—the Bank of Oaxaca,—which, together with branches of the National Bank and the United States Banking company, and an agency of the Bank of London and Mexico, supply the financial needs of the community. Within the last few years the city has assumed much prominence as a base of supplies and headquarters for the many and rapidly developing mines of the State. The streets of the city are laid out somewhat like those of Washington, are lighted by electricity and are well paved and clean. The general style of architecture is Spanish, and the most notable edifices of interest are the Government Palace, the Palace of Justice, the Municipal Palace, Federal Building, Museum and Institute of Science and Art, the Normal School, State Hospital, Charity Hospital and the Municipal Necropolis. The educational institutions include a number of primary schools, the State Institute of Science and Art, in which are taught jurisprudence, medicine, obstetrics, pharmacy, telegraphy and business methods; the Normal School for Men and the Normal School for Women, in which both primary and advanced instruction is given. Two museums—the Oaxaqueño and the Fernando Sologuren—are devoted to the investigation and study of archaeology and the natural sciences. The State Library and the Clerical College Library contain, together, 23,000 volumes. The Cathedral of the city was founded in 1553 and completed in 1730, and is an imposing edifice of gray stone. There are many public gardens or parks—among them the Zocolo, Guadalupe, San Francisco, Netzahualcoyotl and the Constitution. The city is believed to have been founded before the conquest and to have been an important place long before its discovery by the followers of Cortez; was occupied by the Spaniards in 1521, constituted a city by royal charter in 1532 and given the full name—Oaxaca de Juarez,—in 1872. Here were born and reared several of the greatest men of Mexico,—among them President Diaz; the present and long time Secretary of Foreign Relations, Ignacio Mariscal, the late Mateos Romero, many years Minister of Mexico to the United States; and in a poor little hamlet not far distant, the Washington of Mexico—Benito Juarez. Pop. about 35,000.


**Ob, öb, or Obi, ö'bē, Siberia,** a great western river with its head-streams, the Biya and the Katun rising in the Altai Mountains within the frontiers of the Chinese dominions. The river flows northwest and north for 2,120 miles to the Arctic Ocean, which it enters by three mouths at the great Gulf of Ob, an inlet of the Kara Sea, between Nova Zembla and the mainland; the gulf of irregular form extends between lat. 64° 30' and 72° N., and lon. 68° and 77° E., and is ice-bound from October to June. The chief tributaries of the Ob are the Irtysh, Tcharysh, Tom, and Tchulym, all navigable. On the banks of the Ob are the towns of Barnaul, Tomsk, and Tarym. At present only

a few steamers ply on the great water-system of the Ob, of which over 9,000 miles are navigable.

**Obadiah, ö-ba-di'a or öb-a-di'a** ("the Servant of God"), one of the minor prophets. His date may be gathered from the fact that in his brief prophecy he rebukes the Edomites for exulting over the destruction of Jerusalem by Nebuchadrezzar, which took place 587 B.C. Nothing else is known about this prophet.

**The Prophecy.**—A single chapter contains the whole utterance of Obadiah, which is yet of lyrical point and symmetry. It consists of two parts; the first (ver. 1-9) foretells the destruction of Edom. The rocky strongholds of Esau's progeny, their noted sagacity and wisdom, even the number of their allies will avail nothing to help them. The second part (ver. 10-21) gives the reason of this sudden judgment, namely Edom's cruelty to Israel. The prophet earnestly warns them to cease from this unfeeling persecution; urging upon them the fact that Jehovah's punishment on all nations is at hand. When the day of wrath comes, Judah shall be united with Joseph, bring Edom to destruction and regain possession of its hereditary domain.

**O'beah.** See **FETISH**; **OBJ.**

**Obelisk** (Greek *obeliskos*, *obeliskos*; diminutive of *obelos*, "a pointed instrument," "a spit"; Egyptian  *teken*, possibly related to the Hebrew *טקן* *tokan*, "to make even," "level"; Arabic, *Misallat*, "a darning needle"; hence Cleopatra's needle. The Obelisk represents the Sun. The ancient Egyptians were sun-worshippers: they regarded the great luminary as the creator of the universe, the maker of all the gods above and below, and even as the author of himself. The sun as *Ra*, the great god of the Egyptians, was represented upon the monuments by the solar disk. In time several other names and attributes were applied to him. The rising sun was called *Har-em-khu*, "Horus on the horizon." During his daily course he was *Ra*, "the life-giver," representing day, light, etc. The setting sun, the symbol of night, darkness and death, was worshipped as *Tum* or *Temu*. When the number of deities in the Egyptian pantheon multiplied, *Ra* appeared upon the monuments and in the papyri under different forms and names, and is represented alike by animate and inanimate objects. The two most striking and characteristic monuments which represented him on earth were the obelisk and pyramid. The obelisk, symbolical of light and life, represented his daily course; the pyramid, symbolical of darkness and death, the setting sun.

*Ra* was praised as "the Double Obelisk" and the "Double Sphinx" deity (Budge, 'The Gods of the Egyptians,' Vol. I., p. 348). The double sphinx is the symbol of his early rising, and is called *Har-em-khu*, and according to the 'Book of Dead' (q.v.) is the symbol of resurrection. The obelisk is the technical figure of one ray or pencil of light emanating from the sun.

The material chosen for the obelisk was generally red granite, or syenite—a few, however, being of hard sandstone. The former was procured from the granite quarries at Syene (the modern Assouan). Red granite, some Egypt-

ologists think, was chosen for two reasons: First, as being the most durable material, fitly representing the eternal sun. Secondly, on account of its red hue, suggesting the color of the solar disk at his rising and setting.

There were many obelisks throughout Egypt, but *An*, the city of the Sun (Heb., *On*; Greek, *Heliopolis*, the Beth-shemesh of the Bible), was the centre of sun worship and undoubtedly contained several obelisks, but one only now remains. It was erected, according to Petrie, by Usertesen I., a Pharaoh of the 12th dynasty (between 2758-2714 B.C.).

Of the numerous obelisks erected by Usertesen I., Thothmes III., Rameses II., only 48 are still in existence; 10 of which, including the one at Assouan, are prostrate—and 38 are found distributed in the following places: 9 in Egypt, 2 in Constantinople, 12 in Rome, 6 in Naples and other parts of Italy, 2 in France, 4 in England, 2 in Germany, and 1 in United States. These monuments have always excited the cupidity and envy of Egypt's conquerors. Even as early as Augustus Cæsar the work of removing the beautiful monoliths as trophies had begun. According to Rollin (*Oeuvres Complètes de Rollin par M. Latronne*. Nouvelle ed. Vol. I., p. 14) that emperor removed two of those obelisks and made an unsuccessful attempt to remove a third.

The largest of the Egyptian obelisks was removed to Rome and now adorns the piazza of St. John Lateran. It was brought from Thebes to Alexandria (about 330 A.D.) by Constantine the Great; thence to Rome by Constantius who placed it in the Circus Maximus. Its present height is 108 ft. and 7 in. According to Cooper its weight is 455 tons. "On the fall of Rome the obelisk was thrown down and broken into three pieces and it was suffered to remain unnoticed and indeed forgotten, save by a few antiquaries, amidst the ruins of the ancient circus till Pope Sixtus V. caused it to be excavated, restored and re-erected in the present state (1588 A.D.)." Cooper, 'Egyptian Obelisks,' p. 35.

The Obelisk in Central Park, New York and the one on the Thames Embankment, London, are commonly known as "Cleopatra's needles." They were removed from Alexandria. The latter lay prostrate, half buried in sand and was removed in 1877 to England. Our obelisk was brought over to this country at the expense of the late Mr. W. H. Vanderbilt in 1880. Both originally adorned the temple of *Ra* at Heliopolis, and were erected by Thothmes III. (1503-1449 B.C.). The hieroglyphic inscription on our obelisk bears the legends of two Pharaohs, Thothmes III. and Rameses II. The central column on each side speaks of the achievements and triumphs of Thothmes III. over the hereditary enemies of Egypt, the Khetta (the Hittites). The two lateral columns were engraved about 300 years later by order of Rameses II. The legend treats of the same subject. He also fought the *Khetta*.

Commander Gorringe ('Egyptian Obelisks,' p. 115) gives a comparative table of the measurements and weight of these interesting monoliths. According to him the exact measurement of the Obelisk in Central Park is 69 feet 6 inches in height, 7 feet 9 inches thick, at the base and 448,000 lbs. in weight. The London Obelisk is 68 feet, 5 inches in height, 7 feet 8

inches thick at the base, and its weight is 418,000 lbs. The hieroglyphic inscriptions upon the south and west sides of our obelisk are deteriorated. But those on the east and north sides are in good condition. The inscription upon the pyramidions are almost obliterated.

*Bibliography*.—Cooper, 'Egyptian Obelisks' (London, 1877); Yates, 'Remarks on the Obelisks' (1845); King, 'Cleopatra's Needle: A History of the London Obelisk' (London, 1884); Marucchi, 'Gli Obelisch egiziani di Roma' (1898); Gorringe, 'Egyptian Obelisks' (1883); Fontana, 'Della trasportazione dell' Obelisco Vaticano' (1500); Ferry, 'L'Obelisque de Louxor' (1868); L'Hôte, 'Notice historique sur les Obeliskes' (Paris, 1836).

SAMUEL A. BINION,  
Author of 'Ancient Egypt, or Misraim.'

**Ober**, ô'bër, Frederick Albion, American author: b. Beverly, Mass., 13 Feb. 1849. He was educated in the public schools and made a study of ornithology, traveling extensively in the pursuit of his studies and has discovered 22 new species of birds. He has written: 'Camps in the Carribees' (1880); 'Travels in Mexico' (1883); 'Montezuma's Gold Mines' (1885); 'Under the Cuban Flag' (1896); 'Two Boys with Columbus' (1903); etc.

**Oberammergau**, ô'bër-âm'mër-gow, Bavaria. See AMMERGAU; PASSION PLAY.

**Oberhausen**, ô'bër-how-zën, Germany, a town of Rhenish Prussia, in the Rhine Valley, a few miles northeast of Duisburg, an important railway centre and seat of industry, having blast-furnaces, rolling-mills, forges, etc., and productive coal mines.

**Oberholtzer**, ô'bër-holt-sër, Ellis Paxon, American journalist; son of Mrs. S. L. Oberholtzer (q.v.); b. Philadelphia 1868. He was educated at the University of Pennsylvania, was on the editorial staff of the Philadelphia *Evening Telegraph* 1889-96; editor of 'The Manufacturer' (1896-1900), and has been literary and dramatic editor of the Philadelphia *Public Ledger* from 1902. He has published: 'The Referendum in America' (1893); 'Die Beziehung zwischen dem Staat und der Zeitungs-pressen' (1895); 'The New Man' (1897).

**Oberholtzer**, Sara Louisa Vickers, American author: b. Uwchland, Pa., 2 May 1841. She was educated in the Millersville Normal School and in 1862 was married to John Oberholtzer. She is an authority on school savings banks and on economics. Her publications include: 'Violet Lee and Other Poems' (1873); 'Hope's Heart Bells' (1884); etc.

**Oberländer**, ô'bër-län-dër, Adolf, German artist: b. Regensburg 1 Oct. 1845. In 1861 he entered the Munich Art Academy and later became a pupil of Pilotys, making brilliant progress under the instruction of that master. He found that historical painting did not suit his particular talent which he early revealed in a humorous cartoon published in 'Fliegende Blätter' (1863). He subsequently abandoned painting and devoted his entire time to humorous and satirical designs, which showed such striking virtuosity that he became the leading artist on the staff of 'Fliegende Blätter.' He is strong as a caricaturist, and exquisitely delicate as a draughtsman, and his use of satire and ridicule is good-natured and avoids the coarseness

## OBERLIN — OBESITY

and brutality sometimes too apparent in the pages of the comic papers. The majority of his cartoons have been collected and published in the 'Oberländer Album.'

**Oberlin, Jean Frédéric**, zhõn frâ-dâ-rêk ô-bêr-lân, Alsatian clergyman and philanthropist: b. Strasburg 31 Aug. 1740; d. Ban-de-la-Roche 1 June 1826. He was educated at Strasburg and in 1767 became pastor at Ban-de-la-Roche. There he spent the rest of his long life in labor for the material and spiritual improvement of his degraded parishioners. He practised medicine among them, founded a loan and savings bank, introduced cotton manufacture, helped the people build better roads, and brought in modern agricultural methods. His orphan asylums were the beginning of the many "Oberlinvereine" for the protection of children. Beside all this he was a man of rare spirituality, being frequently styled "a saint of the Protestant church," and an excellent pastor, who preached three Sundays each month in French and one in German. Oberlin College (q.v.), Ohio, was named in his honor. Consult the biographies by Butler (English, 1882); Lutteroth (French, 1826; a German version, 1890); and Hackenschmidt (German, 1902); and the life and works of Oberlin as edited by Hilpert and Stoeber (German, 1843).

**Oberlin, ô'bêr-lîn**, Ohio, town in Lorain County; on the Lake Shore & M. S. railroad; about 30 miles west by south of Cleveland. It was settled in 1833 as a college town, and Oberlin College was founded the same year; it was incorporated in 1846. It is in a fertile agricultural region; and its industries are chiefly connected with the farm products; but it has continued as an educational centre. Besides the college there are business schools and well organized system of public schools. Connected with the kindergarten system is an excellent training class. Pop. (1910) 4,365.

**Oberlin College**, at Oberlin, Ohio; coeducational, founded in 1833 under the name Oberlin Collegiate Institute. In 1850 the name was changed to Oberlin College. The preparatory was the first department opened, but within two years the collegiate department and the theological school were organized and in operation. It was among the first colleges in the United States to adopt coeducation, and to admit colored students. Oberlin College was a noted centre from which emanated strong anti-slavery sentiments, and in the vicinity was the "Underground Railroad" (q.v.) so much used in slavery days by the Abolitionists (q.v.). There are departments of music and art, courses in physical training for women, and summer school courses. In 1910 there were connected with the college 137 professors and instructors and about 1,992 students, nearly 1,000 of whom were women. The library (1910) contains about 115,000 bound volumes and 100,000 pamphlets. The grounds and buildings are valued at \$660,000; the scientific apparatus, etc., \$51,000; and the productive fund is \$1,068,800. The annual income from tuitions and fees, is about \$90,000, from the productive funds, \$50,000. In 1901 the benefactions were \$154,700, and the total income from all sources for the same year was \$210,143.

**Oberon, ô'hê-rôn**, in mediæval mythology, the king of all the fairies and husband of

Titania. Oberon is said to be derived originally from the Scandinavian. He has been repeatedly adapted to romance, poetry and the opera.

**Obesity**, an abnormal state of nutrition characterized by an undue deposition of adipose tissue beneath the skin and within the tissues and organs of the body. In states of health the body is more or less covered with a layer of fat, which ordinarily increases and decreases as the state of nutrition varies. Obesity becomes a disease when the increase of adipose tissue constitutes an unwholesome or morbid state leading to interference with the functions of the body in its various parts. The condition may be inherited or acquired. The inciting cause of most but by no means of all cases of obesity is the ingestion of more food than is required by the body. This is particularly true of the foods that are readily converted into adipose tissue—the carbohydrates (starches and sugars), fat, and alcohol. Mental labor consumes comparatively little of these elements, and in those who lead sedentary lives or are naturally indolent these substances, unless sparingly indulged in, are not oxidized and cause the fatty accumulations. There is also an interrelation between the sexual life and obesity, as seen at the time of puberty and at the menopause in many women, and by the deposition of fat in animals after castration. In ordinary cases of obesity the fat accumulates in the form of tiny droplets between the tissue-elements; in fatty degeneration the tissue elements are changed into fat. Fatty degeneration is found in the organs of those not afflicted with obesity, but in the late stages of the disease under consideration this very serious morbid change may come about.

Two chief classes of the obese are commonly observed, the plethoric and the anæmic. In the plethoric type there is a general over-nutrition; the muscles are large and well developed; the blood is very rich in hæmoglobin. The heart enlarges, and at first acts vigorously, but sooner or later there is a weakening of the heart-muscle, changes in the blood-vessels begin, and there may be changes in the liver and kidneys, interfering with their functions. Sudden death from "heart-failure" and apoplexy are common to these cases. In the anæmic type there is general flabbiness of the muscles and impoverishment of blood. Individuals thus affected are troubled with an incapacity for exertion, palpitation of the heart, and shortness of breath. They are not excessive eaters, nor always great drinkers. The tendency to obesity is maintained and increased by the deficiency of hæmoglobin and consequent lack of oxygenation of the tissues. This class of obesity is much more serious than the plethoric, whose subjects may remain in a condition of comparative health for years, in spite of their adiposity.

Obese persons bear disease and accidents badly, and if their body weight is in undue proportion to the height they are recognized as undesirable risks for life insurance on the ordinary terms.

The underlying causes of these disturbances in metabolism are not always clear; while the excess of food consumed to the amount used in physical and mental labor is frequently accountable for the trouble, there is in many instances an undiscovered factor. It is possible that de-

iciencies in the internal secretions from the thyroid and other glands may be in some way connected with the trouble. In myxoedema (q.v.) there is a disorderly deposit of fat through the body, and this disease is apparently due to atrophy of the thyroid gland. Moreover the gland extract has been responsible for a decided diminution of adipose tissue. This is the only treatment with medication that is of any value, reliance usually being placed on dietetic and hygienic measures with success in a large proportion of cases.

Various plans of diet have received their originators' names. Among the first was that practised by William Banting (q.v.) on himself at the advice of Harvey. According to "Bantingism," the patient partakes of only 20 ounces of dry food in 24 hours and over half of this allowance is meat, while the fluid is reduced to 35 ounces. This plan, while it removes the food most likely to form fat, gives to the individual a large amount of nitrogenous matter difficult of digestion and assimilation, and deprives the body of heat-producing substances. Furthermore, the normal fat-supply of the brain is seriously reduced. A small proportion both of fat and carbohydrate must be combined with nitrogenous matter in order to insure normal metabolism.

The Ebstein treatment recognizes the fact that fat is more easily disposed of in the body than starches and sugars, and that meat substances may be converted into fatty tissue when in excess. He therefore allows some fat, a moderate amount of meat, and almost entirely eliminates carbohydrates from the dietary. He also greatly restricts water and forbids alcohol. An ordinary diet-list made up according to this system is as follows: Breakfast, tea without sugar, and dry buttered toast; dinner, meat soup or roasted fat meat with fat gravy, one or two fresh vegetables in moderation, salads, and dried fruits; supper, an egg, moderate allowance of ham or fat meat, and an ounce of thin well-buttered toast or dry bread.

The Oertel plan is much like the Ebstein, but the fats are not so freely given, and the carbohydrates not so sparingly. Great reliance is placed on graduated exercise to strengthen the heart's action, and thus the condition of the patient is improved and the fat oxidated. Patients under his care are made to climb carefully graded mountain paths for specified distances, which increase as the heart becomes stronger. Patients showing respiratory embarrassment are allowed only about 25 grams of fat, 90 grams of carbohydrate, and 150 grams of proteid; those showing no respiratory embarrassment are allowed less proteid and more fat and carbohydrate.

The table prepared by Yeo contrasts these dietaries with the normal average:

	Albuminates grams	Fats grams	Carbo- hydrates grams
Normal average .....	130	84	404
Banting .....	170	10	80
Ebstein .....	100	85	50
Oertel .....	155-179	25-40	70-110

Schweinger's system is practically the same as Oertel's, differing in withholding all fluid until two hours after meals, allowing very little then. Germain See allows a diet of proteid and fat, and requires his patients to take large

amounts of fluid. This plan seems to be well suited to individuals afflicted with gout and rheumatism. Others rely on rest and passive exercise, in the form of Swedish movements, etc., with a skimmed-milk dietary gradually replacing the ordinary food until the skimmed milk becomes the only article allowed. The patient is confined to a single room and for 10 days is allowed to walk but little. Careful watch must be kept that the patient's strength be not overtaxed.

Of these treatments that of Oertel is best adapted to the majority of patients. After treatment is discontinued they evince less disposition again to put on fat, because of the improved oxygenating powers of the blood. The anæmic obese are less benefited than other types, but much can be done for them if the disease has not progressed too far. See CORPULENCE.

Obi, ô'bê, a river in Siberia. See OB.

Obi, ô'bî, Obe, or Obeah, a species of witchcraft practised among the native African and the West Indian negroes. The law of Jamaica, enacted in 1760, which prohibited under severe penalties the practice of obi, enumerates among the materials used for fetiches or spells, blood, feathers, parrots' beaks, dogs' teeth, alligators' teeth, broken bottles, grave dirt, rum, and egg shells. Balls of earth or clay mixed with hair, rags, or feathers, and bound with twine, or in some cases blended with the upper section of the skulls of cats, or stuck round with cats' teeth and claws, or with human or dogs' teeth, and with glass beads, were also used. In 1762 the influence of the obi men produced a formidable insurrection among the slaves in Jamaica, and several of these "sorcerers" were hanged by the authorities. See FETISH; WITCHCRAFT.

Obit, ô'bît or ôb'it (Lat. *obitus*, decease), the service in the church at the solemn interment of the dead; in the Roman Catholic Church an annual religious service, founded for celebrating the memory of a deceased person, and for the expense of which an endowment was left in many European countries. It is also called an annual, or a year's memory. The institution of obits is said to be an ancient one in the church. It is attributed to the practice in the primitive church of commemorating the martyrs, on the anniversary of their deaths. During the period of prosperity following the persecutions similar commemorations were extended to benefactors of the church, and to private individuals by friends and relatives. A like institution, called the commendation of benefactors, is observed in the English universities.

Ob'ject-glass, or Objective. See LENS; MICROSCOPE; TELESCOPE.

Object, Philosophical. See METAPHYSICS.

Object Teaching, a modern name given to a revived method of teaching the young by using objects. The history of educational methods shows that "object teaching" antedates the use of books, as would naturally be inferred from the modernity of the printed and popular book. Books telling about objects—explaining the laws of nature and describing experiments made by scientists—replaced in many schools of the world the observation work which had been done earlier, and which is recognized as neces-

sary for the proper development of the young. A study of the methods used by the teachers mentioned in Old and New Testaments shows that the thing was studied as they learned about "the beginning and ending and midst of the times, the alterations of their courses, and the changes of the seasons, the revolutions of the year and the dispositions of the stars; the nature of living creatures and rage of wild beasts, the force of winds and reasoning of men, the diversities of plants, and the virtues of roots." The leaders among educators always taught that "the concrete should precede the abstract," that observation, thought, and expression are essential for individual development, and that the learner must see, hear, feel, and exercise his senses in order to learn. Comenius (q.v.) said: "Let the senses be applied to the subject as often as possible." Pestalozzi (q.v.) introduced into modern primary teaching a systematized method of using objects for the cultivation of the powers of observation of the young, but not aiming to stop at observation. Froebel (q.v.) and Rosmini (q.v.) contributed valuable information on the subject, the former living long enough to give the world a famous educational system. Comenius is credited with aiding "object teaching" by giving, in his 'Orbis Pictus,' the first school picture book for the young; but a picture book cannot take the place of natural objects, although it does aid in the verification stage of the work. Object teaching as introduced into the schools of the United States has been replaced by Nature Study (q.v.), and incorporated into the work in the natural sciences, drawing, and manual training. Consult: Sheldon, 'Object Lessons'; Calkins, 'Manual of Object Teaching'; Barnard, 'Object Teaching'; Ricks, 'Object Lessons.'

**Oblates.** See **ORDERS, RELIGIOUS.**

**Oboe,** ô'bô-ê, an Italian musical wind instrument resembling a clarinet in shape, and sounded through a double reed. It consists of three joints besides the mouthpiece, and like many other wind instruments, produces a series of overtones.

**Ob'olus,** a Greek coin of silver or copper, the sixth part of a drachm, about 21 cents in value.

**Obongo,** ô-bông'gô, or **Abongo,** a tribe of pigmies who live in different parts of French Kongo in West Africa. See **PIGMIES.**

**Obrenovitch,** ô-brên'ô-vich, Servian princely family, rivals of the Karageorgevitches, who hold the throne since the assassination of Alexander I. (q.v.). See **SERVIA.**

**O'Brien, ô-brî'ên, Cornelius,** Canadian Roman Catholic archbishop: b. New Glasgow, P. E. I., 4 May 1843. He was educated at Saint Dunstan's College, Charlottetown, P. E. I., and at the Propaganda College in Rome, and was for some time professor in Saint Dunstan's College and rector of Saint Dunstan's Cathedral. In 1882 he was consecrated archbishop of Halifax. Among his published works are: 'After Weary Years,' a novel; 'Aminta,' a book of dramatic verse; etc.

**O'Brien, Fitz-James,** Irish-American journalist and poet: b. Limerick, Ireland, 1828; d. Cumberland, Md., 6 April 1862. After study at Dublin University, he went to London, where

he soon got rid of a fortune, and in 1852 came to the United States. He wrote for Brougham's 'Lantern' and became also one of the valued contributors to Harper's 'Monthly' and 'Weekly.' His imaginative short stories, 'The Diamond Lens' and 'The Wondersmith,' first printed in the 'Atlantic,' were of a series notable for originality and effective ingenuity. In 1861 he entered the 7th New York Regiment, and was sent to the defenses of Washington. Later he was appointed to the staff of General F. W. Lander, won praise from McClellan, and on 26 Feb. 1862 received in a skirmish the wound from which he died. He was a true, if a minor, poet, and wrote some very striking prose fiction. William Winter, poet and critic, collected his most worthy work (1881).

**O'Brien, Jeremiah,** American patriot: b. Scarborough, Maine, 1740; d. Machias, Maine, 5 Oct. 1818. He was in the lumber business at Machias at the outbreak of the Revolution. Shortly after Lexington, the British cruiser *Margaretta* appeared in Machias harbor, seeking lumber for the defenses at Boston. Sixty volunteers soon set out in a lumber-sloop, under the leadership of O'Brien, to capture the British vessel. In the following hand-to-hand encounter, the first sea-fight of the war, they were completely victorious. The sloop took on board the *Margaretta's* armament, and renamed the *Machias Liberty*, coasted about, with O'Brien as captain, for 18 months, and took several prizes. O'Brien was later in command of the privateer *Hannibal*, was captured, and was for some months imprisoned in the Mill prison, England, but made his escape.

**O'Brien, Lucius Richard,** Canadian painter: b. Shanty Bay, Ontario, 15 Aug. 1832. He began life as an architect and civil engineer and spent much time sketching in the open air as an amateur. In 1872 he joined the Ontario Society of Artists; in 1880 was appointed president of the Royal Canadian Academy of Art, and in 1895 president of the newly formed Provincial Guild of Sculpture. He is preeminently a portrayer of Canadian scenery and the two pictures of Quebec which he painted by order of Queen Victoria, his views of the Rocky Mountains and Selkirk Range, and his 'Sunrise on the Saguenay' (Art Gallery, Ottawa) are the most characteristic of his works.

**O'Brien, Richard Barry,** Irish author: b. Kilrush, County Clare, Ireland, 1847. He was educated at the Catholic University, Dublin, was admitted to the Irish bar in 1874 and to the English bar the next year, and after practising his profession for a short time in England turned his attention to politics and writing. He has published 'The Irish Land Question and English Public Opinion' (1879); 'The Parliamentary History of the Irish Land Question' (1880); 'Fifty Years of Concessions to Ireland' (1880-5); 'Irish Wrongs and English Remedies' (1887); 'Life of Charles Stewart Parnell' (1898); 'Life of Lord Russell of Kilowen' (1901); etc.

**O'Brien, William,** Irish journalist: b. 2 Oct. 1852. He was for several years a contributor to various journals, in 1880 founded 'United Ireland,' entered Parliament as a Nationalist in 1883, retired in 1895, and was re-elected in 1900. In 1898 he started a new agra-

rian movement, called the United Irish League, with the 'Irish People' as its organ. Among his works is 'Irish Ideas' (1894).

**O'Brien, William Smith**, Irish politician: b. Dromeland, County Clare, Ireland, 17 Oct. 1803; d. Bangor, North Wales, 17 June 1864. He was educated at Harrow and Cambridge, in 1826 entered the House of Commons as member for Ennis and in 1835 was returned for Limerick and retained his seat for 13 years. He was for some time an ardent supporter of O'Connell but on O'Brien becoming the head of the Young Ireland party the friendship was broken. He was active in the insurrection of 1848 and was arrested, tried for high treason, and sentenced to imprisonment for life at Tasmania. He was pardoned in 1856. He was the author of 'The Principles of Government' (1855). Consult: Sullivan, 'New Ireland' (1877); Duffy, 'Young Ireland' (2d ed. 1883).

**Observantines.** See FRANCISCANS.

**Observatory, The United States Naval.** See NAVAL OBSERVATORY, UNITED STATES.

**Obsid'ian**, a vitreous glass of volcanic origin, usually black, but sometimes brown, red, gray, or banded with combinations of these colors, varying from opaque to translucent. It is chemically a rather complex silicate, most commonly of aluminum. Next to its vitreous appearance the most striking physical characteristic is its conchoidal fracture, which was utilized by primitive races for the making of knives, and weapon-heads, notably by the Mexicans, who called the material *itztli* and quarried it in their mountains. The principal American variety is the chatoyante or cat's-eye, which contains a ruddy golden or silvery white gleam. The liparobsidians, or those resembling liparites, are best typified by the famous Obsidian Cliff in Yellowstone National Park; other acid obsidians are found in California, Mexico, Hungary, the Lipari Islands, and New Zealand. More basic sorts averaging 65 per cent of silica are found in Iceland, the Azores, and Milo. The vitreous type (with about 53 per cent of silica) occurs in volcanic districts, notably Kilauea and Réunion.

**Obstet'rical Frog, or Midwife Toad**, a small European frog (*Alytes obstetricans*) which has the general appearance of a smooth toad. The upper parts bear many warts and are variegated in color, reddish spots becoming conspicuous in the males at the breeding season, and the under parts are dull white. It is found in Spain, Portugal, southern France and Switzerland, on high mountains as well as in the lowlands, and in town gardens and parks as well as in the remotest wilds, wherever a little water is available for a home. The species is thus very numerous, yet is rarely seen, for it is nocturnal, hiding quietly by day in some dark nook, or in a little hole dug in the ground by itself. At night, during all the warmer months, the males call to one another incessantly in a tinkling note which is not loud enough to be annoying. This frog gets its names from its peculiar manner of caring for its eggs. When the female feels the time approach for the discharge of her eggs, the male mounts upon her back and waits, assisting her efforts, for the extrusion of the ova, which at last happens sud-

denly. This takes place on land, not in the water. The eggs are comparatively large, and from 50 to 100 in number, connected by a gelatinous cord into two strings; and they are caught and retained, as in a dish, by the thighs of the female, which are extended straight behind her, close together. The male immediately fertilizes the eggs, and then proceeds to wind them about the upper part of his own legs, by thrusting his feet back and forth through the mass until they are fastened upon his thighs to his satisfaction. The female is then released, and the male carries his burden to his hole, where he remains, going abroad at night in search of food and to moisten the eggs in the dew, or occasionally in a puddle or pond. After about three weeks, the embryos are nearly mature, and the father takes them to the nearest water and remains within it until (soon) the tadpoles emerge. They are in a more advanced stage than in most frogs, but do not complete their metamorphosis until the following spring. Consult: Fischer-Swigart, 'Zoologischer Garten,' Berlin, 1885; Gadow, 'Amphibia and Reptiles' (1901).

**Obstetrics**, that department of medical practice which deals with the care and treatment of women during and after pregnancy and childbirth, and with the care of the child when born. It is one of the most important branches of medicine. The study of all of the parts of the female body concerned in the processes of procreation, the normal and abnormal functions during pregnancy and childbirth, beside the care of the mother and child during the early weeks following birth, all fall within its province. Although the function of child-bearing is strictly physiological, it is a process of great complexity and shows many abnormal features, so that in ancient as well as in modern times it has always caused an immense amount of sickness and suffering. Happily the art of obstetrics is being established on a rational and scientific basis, and the mortality, suffering, and after-invalidism due to child-bearing are being reduced to a minimum. As would be natural with such a universal fact as reproduction, many and curious myths and customs have had their day, to give way to equally fantastic ideas. Among ancient peoples obstetrics had its special workers, and among savages at the present time a crude obstetric art is practised. Among the Chinese in prehistoric times (3000 B.C.) midwives were the chief attendants on pregnant women. The length of pregnancy is given in the oldest existing works on medicine as 270 days. Women then were compelled to stay in bed at least three days and for 14 days were not allowed to see visitors. In ancient Assyria and Babylonia midwives were many, and to these women helpers was entrusted the care of the pregnant woman. This custom has continued to the present time, but with the gradual increase in education the better qualified physician is called upon with increasing benefit both to the mother and child. Physicians have also, however, been employed in this work since the earliest times. The modern era of obstetrics covers scarcely more than 30 years. The practical annihilation of puerperal sepsis by methods of cleanliness has revolutionized the whole subject of obstetrics, as the knowledge of bacterial infections has done with every branch of medi-



cine. As the foetus is practically under the control of the obstetrician at the present time, and as the danger of blood-poisoning can be eliminated, obstetrics, in the hands of the properly qualified, has risen to the level of an exact science. Women still die of childbed fever, but lack of proper care is the cause. Cleanliness is salvation. Dirty hands or finger-nails on the part of the nurse, midwife, or doctor may be fatal, and every mother should know it. In different lands and in varying races the age of child-bearing varies from about 10 to 18. In European races the average is about 14 to 15. Women of warmer climates mature more rapidly than those of the temperate zones. The general period of cessation of child-bearing is about the 45th year. Eight years is about the earliest authentic recorded age of pregnancy, and women of 60 or 70 have been known to have children. One case of pregnancy, with birth of child, is said to have occurred in a woman of 103 years, but the authenticity of this is doubtful. Following impregnation, which occurs normally only as a result of coitus, the ovum, which in the great majority of cases has previously come from the ovary, descends the Fallopian tube and becomes fastened to the wall of the uterus. Here a rich supply of blood-vessels grows up and around it to nourish the developing foetus. This set of blood-vessels subsequently becomes the placenta, or afterbirth, and constitutes the chief medium of blood-supply between mother and child. Following impregnation a characteristic series of symptoms occur in the pregnant woman. Menstruation ceases, as a rule, the breasts begin to give peculiar sensations, the woman urinates more freely, and her nipples have darker lines about them. These are the early signs. Later—from six weeks to a few months—she notes morning discomfort, with perhaps nausea and vomiting; constipation begins to annoy her; the abdomen begins to swell; the breasts become tender; and the bladder grows troublesome. Still later the nausea may disappear; the swelling uterus makes itself more and more prominent; the breasts become fuller, firmer, and have a waxy exudation. At the end of about nine months—270 to 280 days—labor begins. This is usually preceded for about two weeks by a distinct drop of the child in the pelvis, whereby the waist-line sinks very perceptibly. Labor is ushered in by some premonitory cramp-like growls, with inability to hold the urine, and by the escape of a certain amount of fluid in which the child has floated for the final three or four months or more. Irregular pains, which slowly increase in severity, cramp-like in character and intermitting, continue for from 4 to 24 hours or more. These constitute the first stage of labor, and are premonitory and useful in dilating the opening of the uterus (q.v.), the cervix. The pains become more severe and frequent, and longer in duration, and the second stage of labor, during which the child is to be squeezed out of the uterus, begins. This is a very distressing time and, were it not for the intermissions in the pain, would be unendurable. The pains become faster and harder, the bag of water usually bursts, and with further cramps the child progresses, head-first, through the vagina into the world. Here meeting with a cold reception when compared to the warmth of the body from which he came, he reflexly cries

out and, with cleansed mouth, takes his fill of air.

Following the birth of the child there is a quiescent period for a few moments to half an hour, then with further pain the uterus squeezes out the afterbirth, and the third stage of labor is completed. The cord connecting the child and the placenta is cut between two knots and the infant becomes an entity. The length of time of the second stage varies widely. In first children, and in older women, with the first baby particularly, it is apt to be longer. From two to six hours may be said to be the average. Following the birth, the mother should lie in bed, and the child be put to her breast at regular two-hour intervals. Although the milk will not come for a few days, the child begins a regular habit, and the breast receives its normal stimulus. It is wise for the young mother to remain in bed at least 10 days, as this favors the return of the uterus to its normal size and place. Many deviations from this normal course may take place.

**Ocala**, ô-kā'la, Fla., city, county-seat of Marion County; on the Florida Central & P. and the Plant System R.R.'s; about 160 miles in direct line southeast of Tallahassee and 70 miles southwest of Saint Augustine. The noted Silver Spring is about five miles east of Ocala. It is in a region in which are raised large quantities of cotton, oranges, and vegetables. Other products which are sent to northern markets are lemons and sweet-potatoes. It has considerable trade in phosphate found in the vicinity. The sewerage system is most unique, it being formed by a subterranean river, which was accidentally discovered while drilling for a well. Neither the source nor the mouth of the river have been discovered. The city owns and operates the electric-light plant. Pop. (1890) 2,904; (1900) 3,380; (1910) 4,370.

**Ocala Platform**, in American politics, a series of resolutions passed at the national congress of the Farmers' Alliance, held at Ocala, Fla., 8 Dec. 1890. It demanded the abolition of national banks; the establishment of sub-treasuries which should lend money directly to the people at low rates of interest, free coinage of silver, low tariff, the prohibition of alien ownership of land, and a graduated income tax.

**O'Callaghan**, ô-kāl'ā-hān, Edmund Bailey, American historian: b. Mallow, County Cork, Ireland, 27 May 1797; d. New York 27 May 1880. He was educated in Ireland and in France, removed to Canada in 1823, where in 1827 he became a medical practitioner, and was editor of the 'Vindicator' in 1834. He was elected to the assembly of Quebec in 1836, but after the insurrection (1837) he removed to the United States, where he spent many years in the office of the secretary of state at Albany employed in editing the records of the State. He wrote: 'History of the New Netherlands' (1846); 'A Calendar of the Land Papers' (1864); 'Voyages of the Slavers St. John and Arms' (1867); etc.

**Ocaña**, ô-kā'ña, Colombia, a town in the department of Santander, on the Taira River, 230 miles north of Bogota. It was founded in 1572, and is the commercial centre for the coal,

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lead, coffee, and other products of the district. Pop. 6,000.

**Ocarina**, ôk-a-rě'na, a musical instrument originally used in Calabria by the peasants. It consists of a gourd-shaped clay bulb, pierced with a number of small holes and a mouthpiece. Its tone was sweet, but the range was exceedingly limited—less than an octave—but in the course of subsequent development its compass and power were greatly augmented.

**Occam**, ôk'am, or **Ockham**, **William** of, mediæval controversialist, of the Franciscan order, known as "VENERABILIS INCEPTOR" and "DOCTOR INVINCIBILIS": b. Ockham, Surrey, 1270; d. Munich 7 April 1349. He was educated at Oxford, where he studied under Duns Scotus, and subsequently proceeded to the University of Paris. He took part (1321) in the controversy on the subject of "evangelical poverty," and was present at the general chapter of Perugia, which decided it in the following year. Pope John XXII. condemned the decision of the chapter, and Occam defended it against him, for which he was by order of the Pope imprisoned at Avignon. He escaped, however 1328, and a vessel sent by Louis the Bavarian conveyed him to Italy. The Pope excommunicated the fugitive, and vainly tried to get him sent back to Avignon, but Occam from that time resided at the court of Louis and engaged in polemical warfare with papal authority. He charged John XXII. with teaching heresies, and when Louis in 1348 declared the imperial accession independent of papal confirmation Occam supported him. On the death of Michael da Cesena in 1342 he became general of his order, though not recognized by the Pope. In logic and philosophy Occam occupies a distinguished place. His principal work is 'Summa Totius Logices.' Consult: Riezler, 'Die literarischen Widersacher der Päpste zur Zeit Ludwig des Baierns' (1874); and Poole's article in the 'Dictionary of National Biography,' Vol. XLI.

**Oc'canee'chi** Indians, an American tribe of the Siouan family residing in southern Virginia in the 17th century. They aided the white settlers against the invasion of northern Indians in 1676. In 1701 they removed to North Carolina, near the present town of Hillsboro, and disappeared by uniting with other tribes.

**Occasional Causes.** See DESCARTES, RENÉ; METAPHYSICS.

**Occleve**, ôk'klëv, or **Hoccleve**, **Thomas**, English poet of the 15th century: b. about 1370; d. about 1450, both dates being based merely on the internal evidence of his poems. He evidently knew Chaucer, and the famous portrait of Chaucer on the margin of the Harleian MS. of the 'De Regimine Principum' may have been drawn by Occleve himself. Besides this poem, which was edited by Wright in 1860, Occleve wrote the autobiographic sketch 'La Male Regle de T. Occleve,' and various shorter poems, the most notable being the 'Mother of God,' an orison to the Virgin, long attributed to Chaucer. Occleve's poems are edited by Furnivall (1892-7).

**Occlu'sion**, in chemistry, a name given by Graham to the property of metals to absorb, or hold in solution, gases. This property is most remarkably displayed by platinum and palladium in their affinity for hydrogen, of which platinum

will absorb 114 times its own volume and palladium between 700 and 800 times its own volume. The entire class of oxides illustrates again this special kind of absorption. The term is also used of mere surface condensation, as of ammonia or oxygen in charcoal.

**Occom**, ôk'ôm, **Samson**, Indian preacher: b. Mohegan, New London County, Conn., about 1723; d. New Stockbridge, N. Y., 14 July 1792. He entered the Indian school of Mr. Wheelock at Lebanon, remained there four years; in 1748 kept a school in New London, but shortly after removed to Montauk, Long Island, where he taught and as a licensed Congregational minister preached to the Indians. In 1759 he was ordained to the Presbyterian ministry, with which he remained connected. In 1766 Mr. Wheelock sent him to England as an agent for an Indian charity school. Being the first Indian preacher who had visited that country, he was successful in attracting large audiences and obtaining donations exceeding £10,000. After his return to America. Occom preached at various places, passing his latter years within the bounds of the Albany presbytery. He wrote an account of the Montauk Indians, printed in the (Mass.) Historical Society collections (1st series, vol. x.), and published a sermon on the execution of an Indian at New Haven in 1772.

**Occlusion.** The occultations of stars and planets by the moon, as in its eastward motion during the month it passes in front of star or planet and blots them for a while from view, have, in a measure, their counterpart in occultations of stars by planets, or by comets, and also in the occultations of satellites by their primaries.

**Occlusions of the Moon.**—The general theory of occultations is analogous to that of solar eclipses. (See ECLIPSE, Bibliography.) For stellar occultations, however, considerable simplification occurs because the apparent radius of the occulted body is indefinitely small and there are but two instants to be computed, namely, the immersion or disappearance of the star, and its emersion or reappearance from behind the moon's disk. The elements for the prediction of the occultations of stars are given in all the national ephemerides, chiefly according to Bessel's method. In the 'American Ephemeris' these elements are given for stars down to 7.5 magnitude. Observations of the occultations of stars are chiefly valuable as furnishing indispensable data for determining the distance, size, and motions of the moon. (See MOON.) The accuracy of a lunar position thus determined is many times that of the ordinary meridian observations of the moon's limb. The occasion of a total lunar eclipse offers special facilities for determining with great accuracy the occultations of a number of small stars. The best lunar method of determining the longitude of a place is that of observing the occultations of stars, and it has only been superseded by the telegraphic method of the comparison of signals.

The immersion and emersion of stars in occultations by the moon are accompanied by phenomena of a varied character, which have been the subject of much discussion. Some astronomers have been willing to dispose of all these phenomena by vaguely describing them as due to physiological causes, without attempting any scientific explanation, and without

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satisfying the experience of the more acute and sensitive observers. The various phenomena noted may be scheduled as follows: (1) Instantaneous disappearance or reappearance of the star. (2) Apparent projection of the star upon the moon's limb. (3) Sudden change of magnitude. (4) A slow disappearance or reappearance, sometimes described as "gliding". The instantaneous immersion or emersion of the dark limb is naturally to be expected, and is readily accounted for by the assumption that the moon has no appreciable atmosphere, and that the apparent angular diameter of the stars is insensibly small. This instantaneous disappearance is very usual under conditions of good seeing, although under such conditions also, when the star apparently approaches closely to the moon's serrations along the dark north or south limb, it has been seen to disappear behind a mountain and reappear in the next valley, and so on. Such instances have been particularly noted by the elder Bond and by Davidson. These disappearances and reappearances are to be distinguished sharply from those not associated with the finest definition. Sensible displacement of stars with respect to the moon at occultation, or a "clinging" upon the lunar limb, has frequently been observed, and although attributed by Innes to improper focusing, or focusing on the red star so as to throw the moon's image out with respect to it, it is probably, as Davidson suggests, due to the formation of a "fictitious or spurious limb" of the moon by irregular refraction, upon which the star is projected through the unconsciously selective action of the eye on the star image. It is chiefly large, bright, and mostly red stars, like Aldebaran and Antares, that have been projected upon the whitish, spurious border of the moon. "With a large, colored star," says Davidson, "all the phases of this phenomenon are unmistakable; with a large white star, they may be somewhat in doubt; with a small white star, they will probably not be noted, especially in small telescopes with low power." With this phenomenon the true immersion is still instantaneous. Sudden decrease in the magnitude of the disappearing star, as if in two distinct stages, has again and again been noted by expert observers. In certain instances this distinct phenomenon has been proved to be due, and in all cases is probably due, to the occultation of a double star. It seems likely that a very close observation of these light changes at occultation will more and more be deemed a valuable means of detecting very close double stars lying in the moon's path. The "gliding" or gradual occultation of stars is, with some show of probability, attributed by Innes to occultation of double stars too close to make a separate physiological impress. He thinks that close doubles of a period too long for spectroscopic discovery and yet too close for visual detection, may thus reveal themselves by the magnification due to the appreciable interval taken by the moon in traversing an arc too small for direct measurement. In both of the cases of "disappearance in two distinct stages" and of "gliding" the position angle of the double star with respect to the moon's path, as well as the angular separation of the components, enters as a factor of the delicate phenomenon.

*Occultations of Planets.*—The phenomena attendant upon occultations of planets by the moon differ somewhat from those of stars. The

beautiful and startling appearance which Venus and the new moon present to the unaided eye at the time of this planet's occultation, and the early association of the new moon with religious festivals, has led to the crystallization of this phenomenon as a symbol on the Turkish flag and is also thrice emblazoned on the Egyptian. The phenomenon of an occultation of Jupiter, photographed and visually observed at Arequipa in 1892, led W. H. Pickering to an interesting discussion of the apparent effect of a slight lunar atmosphere. Of an occultation of Saturn 3 Sept. 1900, G. G. Tupman says that it "disappeared at dark limb, which was not visible except on the planet and ring. The last little patch of light, longer than broad, parallel to the moon's limb, seemed to linger strangely. The distance of centres was diminishing 0.28" per second, and the moon seemed to travel very rapidly across the planet and ring." It seems undesirable to speculate on this phenomenon further than to class it with similar phenomena of displacement of stars at the occulting limb of the moon.

*Occultations by Planets.*—The observation of the occultations of stars by planets may be utilized in determining the position and diameter of the planets, and in securing some knowledge of the effect of their atmospheres on the phenomena. The prediction of these occultations by planets was for some time annually made by Berberich of the 'Astronomisches Jahrbuch.' The phenomena of immersion and emersion have, in the cases of Mars as observed by South, and of Venus by Cerruli, been practically instantaneous. Only a slight hesitancy in reappearance was noted in the latter case. An occultation of a 6.5 magnitude star by Jupiter, as recently observed by H. Struve, gave the times of the immersion and the emersion uncertain from 7 to 10 seconds and showed these times to be phenomena of a gradual character.

*Occultations of Satellites.*—The occultations of Jupiter's satellites by the planet are a part of the general theory of the configuration of the Jovian System as seen from the earth, and are regularly predicted in the 'American Ephemeris' and 'Nautical Almanac,' and other Ephemerides. The projection of the satellites within the apparent limb of Jupiter at occultation, has been seen by many observers and is satisfactorily explained by the effects of atmospheric disturbances on the planetary edge just as in the case of the star's projection on the disturbed and spurious limb of the moon.

*Occultations by Comets.*—The passage of comets over stars, as visually and photographically observed, has disclosed some facts of interest in this class of occultations. Until quite recently, all observers agreed that the nebulous envelopes of comets do not absorb the light of stars, and long ago Olbers had shown that there was no evidence of refraction by comets. One eminent observer after another has recorded the occultation of a star or cluster of stars by a comet without sensible diminution of the light of the stars, and this phenomenon has also been markedly attested by the photography of comets. A few observers have noted the diminution or even the complete extinction of stellar light in their occultations by comets. Max Wolf has, moreover, recently demonstrated by photography that the envelope of Comet 1903c exercised a selective absorption on a 6.5 magnitude star and that the same comet failed to absorb the light

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of a less brilliant star of a different type. The projection of the stars upon the envelopes and tails of comets thus not only affords means for accurate measurement of the position and form of these objects, but promises to supply occasional hints of the cometary absorption of stellar light.

**Bibliography.**—Bessel's method of treating predictions of occultations is given in 'Astronomische Nachrichten' (No. 145). A number of graphical, or partly graphical, methods, useful to observers in predicting occultations, have been published in recent years. Among these may be mentioned the suggestions of G. W. Hough in 'Popular Astronomy' for 1897; Major Grant's diagram given in 'Hints to Travellers'; M. G. Bijourdan, 'Occultations' in the 'Annales de l'Observatoire de Paris' (Vol. XXIII.), and the graphical method of Rigge, No. 3786, 'Astronomische Nachrichten.' In the same journal, (No. 2388), Seeliger has discussed the conditions of frequency of occultation of stars by planets.

MONROE B. SNYDER.

**Occ'upancy.** See POSSESSION, LAW OF.

**Occupation, Hygiene of.** This subject covers a consideration of the health of those who labor as affected by the varieties and conditions of their work, as well as a consideration of disease or deterioration arising from trades and pursuits. Its consideration, therefore, includes much that has been discussed under hygiene and sanitation (q.v.), such as a proper amount of sunlight, adequate air-space in proportion to the number of people in a room, frequent or constant ventilation, the removal of waste products, the condition of the soil under dwelling or factory, the regulation of temperature, water-supply and drainage, etc.

In the special field of hygiene of occupation are included maladies resulting from harmful influences in certain occupations, whether due to poisons, infections, or irritants. Legislation has, in many countries, been directed toward the improvement of all the conditions of labor, and has resulted in shortening hours, prohibiting the young or immature from certain work, and neutralizing poisons; and the tendency of paternal law is to place industrial diseases on the same footing as accidents occurring at work. Ordinances generally fail of being effective in the cases of those who work at home, and this part of the problem is very serious. Scientific experiments are establishing the laws of muscular activity, and in the near future the pathology of fatigue will become so exact a branch of physiology that the workingman will be protected against the condition of being overtired, physically or intellectually, a condition during which resistive power is lessened and disease is invited. Outdoor occupations entail less disease and result in a much lower mortality than indoor pursuits. In fact, among gardeners and nurserymen deaths are but 55 per cent as frequent as among a general male population. The mortality of farmers varies from 31 per cent in youth to 88 per cent in old age of the mortality of a general male population. Reasoning from mortality statistics as to the amount of damage to health resulting from occupation is always open to objection, because of the admitted facts that alcoholism and phthisis cause a large number of deaths among occupied males.

A fair conspectus of the subject will result from considering the trade diseases under the heads which follow:

**Dust-Producing Occupations.**—Among the trades in which dust is a deleterious agency are those of the baker, blacksmith, brass-worker, bricklayer, carpet manufacturer, cooper, copper-smith, cotton manufacturer, cutler, filemaker, gunsmith, iron and steel worker, lead-worker, locksmith, ropemaker, stonecutter, tin-worker, wool manufacturer and zinc-worker. In these industries the mortality from diseases of the respiratory organs is twice that of agriculturists. A fibrosis of the lung, in many cases, and in others pulmonary tuberculosis results from the bombardment of the lung tissue with fine particles inhaled. Many eye affections also result from dust.

**Workers in Poisons.**—Those who work in poisons show a large mortality. The members of this class are those working with lead, arsenic, phosphorus, mercury, the bichromates, copper, brass, india rubber, tobacco, chemicals, and drugs. Lead-miners, lead-smelters, makers of litharge, white-lead workers, calico-printers, ironware enameled, type-founders, compositors, painters, plumbers, glass-polishers, file-cutters, potters, and chromo-lithographers suffer from lead-poisoning (see LEAD). Workers in colored papers, wallpapers, toys, japanned goods, imitation leather, for which arsenical pigments are used, as well as taxidermists, suffer from arsenic poisoning. Among the symptoms are conjunctivitis, nasal catarrh, headache, colic, diarrhoea, bronchial catarrh, dyspepsia, boils, insomnia, depression, and (rarely) paralysis. Makers of matches suffer from inflamed and painful gums, decaying teeth, and death of the jawbone, as a result of phosphorus-poisoning; they become pale, ill-nourished and tuberculous. Mercury-poisoning is the penalty of smelting cinabar, making thermometers and barometers, making incandescent electric lamps (with a mercury vacuum), gilding, making vermilion, and treating furs. The symptoms are salivation, sore mouth, loss of teeth, headache, dizziness, pains in limbs, twitching of muscles of face, marked and disabling tremor, and general nervousness. The bichromates of potassium and sodium are used in making colors, calico-printing and photography, as they are excellent mordants for wool. They cause bronchitis, asthma, and ulcers, especially ulcers of the nasal cartilages. Copper and brass workers suffer from languor, depression, cold perspiration, nausea, muscular pains, headache, fever, and great debility. India-rubber workers are poisoned by the bisulphide of carbon used. Tobacco and cigar-makers, especially when tyros, suffer from headache, nausea, dizziness, faintness, transient loss of sight, and catarrh, and patches of induration appear in their lungs. The makers of drugs and chemicals suffer from the fumes of acids and irritating gases, from high temperatures, and from alkali dust.

**Mining and Quarrying.**—These occupations involve danger to life and health from accidents, such as being crushed by rock or coal, or injured by machinery, explosions, falling from ladders, etc.; and from gases and foul drinking-water.

**Workers in Compressed Air.**—These suffer from caisson disease (q.v.).

**Trades Risking Infection.**—Such trades are the working in hides or horsehair, wool-sorting, whereby anthrax (q.v.) is contracted; also rag-sorting and grinding, those who work at which being liable to any disease prevalent in the country from which the rags come.

**Occupation Neuroses.**—Disorders so classed are nerve affections whereby the worker is incapacitated as a result of muscle-tire. Overuse causes a constant fatigue in certain groups of muscles. The most prevalent examples of this class is writers' cramp, which dates from 1820, when steel pens displaced quills. It is oftener found in men than in women, and occurs mainly between the ages of 25 and 40. Continuous writing, especially under mental pressure, operates as the exciting cause; but like all occupation neuroses, it is grafted on an underlying neurasthenia, runs a chronic course, and is difficult to relieve. During the use of the pen, the hand clenches involuntarily, and the pen is driven into the paper and downward toward the wrist. The use of the typewriter is the only refuge, though many forms of apparatus have been devised to obviate the trouble. In some cases neuritis follows. Other forms of these neuroses are telegraphers' cramp, affecting one in 200 operators; musicians' cramp; milkers' spasm, a rare affection; sewing spasm; etc. In these cases the underlying neurasthenia must be treated. Rest, massage, electricity, and hydrotherapy are useful.

In the treatment of all trade diseases removal of the cause is imperative. In nearly all of them ventilation and sanitary precautions are essential. Organic conditions must be treated separately, according to their nature. Consult Arlidge, 'Hygiene and Diseases of Occupations' (1872); Oliver, 'Trade Diseases' (1903).

**Ocean, The, or Sea,** comprises the continuous body of water which covers the greater part of the earth's surface, the area being  $2\frac{1}{2}$  times that of the dry land. The latter is for its greater part aggregated on the Northern hemisphere, the Southern is preeminently oceanic. The Ocean is divided into five great divisions which have partly natural, partly imaginary boundaries.

**The Pacific,** the largest one, is bounded on the east by America and the meridian of Cape Horn, on the west by Asia, the Great Sunda Islands, Australia and the meridian of Tasmania, on the north it terminates in Bering Strait and on the south at the Antarctic circle.

**The Atlantic Ocean,** the next in size, is bounded on the east by the coasts of Europe, Africa and the meridian of Cape Agulhas, on the west by America and the meridian of Cape Horn, and on the north and south by the Arctic and Antarctic circles respectively.

**The Indian Ocean** is bounded on the east by the Great Sunda Islands, the west and south coast of Australia and the meridian of Tasmania, on the west by the coast of Africa and the meridian of Cape Agulhas, on the north by the coast of Asia and on the south by the Antarctic circle.

**The Arctic and Antarctic Oceans** comprise the waters between the Arctic circle and the North Pole, the Antarctic circle and the South Pole respectively. The actual boundaries of the oceans do not always agree with these theoretical ones; thus the northern coasts of

America, Europe and Asia are the actual boundaries of the Arctic Ocean; Hudson Bay and the White Sea are included, although they reach far into the Temperate zone. Furthermore, the Arctic circle is not the actual boundary between the Arctic Ocean and the Atlantic, but a line drawn from Greenland to Norway by way of Iceland, the Farøe and Shetland Islands. From a morphological point of view there is no such thing as an Antarctic Ocean; there are no land surfaces or submerged ridges that separate it from the adjoining oceans. The area should properly be divided among the adjoining great oceans—the Atlantic, Pacific and Indian; when we speak popularly of Antarctic Sea and Antarctic expeditions we refer to the entire region that lies south of the extreme southern points of the land masses, Cape Horn, Cape Agulhas and Tasmania, in latitudes  $56^{\circ}$  S.,  $34^{\circ} 51'$  S., and  $43^{\circ} 40'$  S., respectively.

**Areas.**—The areas of the three great oceans are given at 67.7 million square miles for the Pacific, 34.7 for the Atlantic, and 18.6 for the Indian. The two Polar Seas are much smaller, but no exact figures can be given for the reason that there are about 3.1 million square miles in the North Polar regions and 8.3 in the South Polar regions wholly unexplored. The highest latitudes reached in the eastern Arctic Ocean are  $86^{\circ} 13'$  in lon.  $96\frac{1}{2}^{\circ}$  E. (by Nansen, 1900),  $86^{\circ} 34'$  in lon.  $64\frac{1}{2}^{\circ}$  E. (by Cagni), in the western Arctic Ocean  $84^{\circ} 17'$  to the northward of Greenland (by Peary, 1902). In the Antarctic Ocean the highest latitudes are  $74^{\circ} 15'$  in lon.  $34^{\circ}$  W. (Weddell, 1823),  $71^{\circ} 36'$  in lon.  $88^{\circ}$  W. (the Belgian Expedition, 1898), and  $78^{\circ} 50'$  in lon.  $167^{\circ}$  W. As to dimensions, the Pacific is the widest, with 9,400 nautical miles between Panama and the Philippines; the Atlantic is much narrower, about 3,700 nautical miles between Cape Agulhas and the La Plata, or 4,500 miles between Cape Bojador on the African Coast and the Rio Grande, if we include the Gulf of Mexico. The Indian Ocean has its greatest width between the southern capes of Africa and Australia, over 6,000 nautical miles. The distribution of islands plays a prominent part in the physiognomy of the oceans. We have to distinguish between oceanic and continental islands. The open Atlantic is rather poor in oceanic islands, more so is the eastern part of the Pacific, and especially poor is the northern part of the latter ocean and the eastern part of the Indian Ocean. The South Pacific is unsurpassed for its wealth of oceanic islands; "small size" is a characteristic feature of these islands, in fact the hundreds and thousands of Polynesian Islands have a total area less than that of Celebes. Each ocean has its share of continental islands, which includes not only those near continents, but also such as have a continental structure, of which New Zealand is a type. The Pacific has its East Indian Archipelago, New Guinea, etc.; the Atlantic, the British Islands, the Antilles; the Indian Ocean, Madagascar and Ceylon; the Arctic, Greenland, Nova Zembla, etc. According to size Greenland with 0.81 million square miles heads the list of large continental islands, with New Guinea, Borneo, Madagascar, Sumatra, Nipon, Celebes, Java and Cuba following in the order of size. There is yet another element which imparts diversity of character, not only to different oceans, but to

different parts of the same ocean—the development of the coast line. An ample development, the presence of deep incisions, is considered a great factor in the promotion of culture. Europe with the Mediterranean, Baltic, North Sea and English Channel; the eastern coast of North America with the Gulf of Saint Lawrence, the Gulf of Mexico and Caribbean Sea, are especially favored in this respect, while the absence of deep incisions is noticeable in the contour lines of the southern continents, notably Africa and South America. A very peculiar feature in this respect is the border seas which line the eastern coast of Asia, these are in succession, commencing at Bering Strait, the Bering Sea, Okhotsk Sea, Japan Sea, East Sea, and South China Sea. A very rich development, though on a smaller scale, is imparted by glacial action to coast lines in northern regions; we notice this especially on the coasts of Norway, Iceland, Greenland, and the northeast and northwest coasts of America.

*Depth.*—The mean elevation of the land surface is estimated at about 383 fathoms, and the mean depth of the sea at between 1,900 and 2,000 fathoms, hence the latter is about five times as great as the former; but, in spite of this disparity, the culminating heights of the land (the Gaurisankar with 29,000 feet) approach very nearly the greatest depths of the sea (the Guam trench with 5,269 fathoms or 31,614 feet). The mean depth of the three great oceans is about the same, the Pacific is slightly deeper and the Indian rather shallower than the Atlantic Ocean.

The bed of the Atlantic has a peculiar form; instead of one deep basin separating the Old and New Worlds, as it was thought to be fifty years ago, there are two separate troughs, one on the American and the other on the European side, separated by a rise which commences at Iceland and passes through the middle of the ocean, taking in on its course the Azores, Saint Paul and Ascension Islands, and has been traced as far south as lat. 40° S. This rise was formerly designated the Dolphin Rise, but in modern nomenclature it is Atlantic Rise. The troughs, which are divided by gentle swells into several basins, terminate on the south in two cross ridges, the Rio Grande and Whale Ridges, and on the north in a ridge stretching from Greenland to Iceland and thence to the Shetland Islands. It is called the Icelandic Ridge and has a depth of less than 328 fathoms. The depth of the basins exceeds 3,000 fathoms (3,825 southeast of the Bermudas). The greatest depth, however, 4,662 fathoms, is not found in these basins, but in a trench off Porto Rico which terminates in the Old Bahama Channel. It has been noticed that the arms of the North Atlantic in the higher latitudes, like the Baltic, North Sea and English Channel on the European side, and Hudson Bay and the Gulf of Saint Lawrence on the American side, are shallow, while those in lower latitudes have comparatively great depths, the Mediterranean 2,406 fathoms, the Bay of Biscay 2,625 fathoms, the Gulf of Mexico 2,119 fathoms, and the Caribbean Sea 3,428 fathoms.

In the Pacific we find the northern part decidedly deeper than the southern. In about lat. 20° N. are the Hawaiian Islands rising from a plateau of over 1,000 fathoms depth and to the northward and southward of it are basins with over 3,000 fathoms depth which extend in

an east and west direction over the greater part of the width of the ocean. The southeastern Pacific or, more definitely speaking, that part to the eastward of the Marquesas and other coral islands, appears to have been more charily located by the explorers and surveyors than any other part of the great oceans. We have no exact knowledge of the disposition of its basins and ridges, but may form some conception of the depths from the observation that, barring the immediate vicinity of the coast, there are no soundings recorded of less depth than 1,450 fathoms, or more than 2,711 fathoms. Farther west we notice the groups of innumerable coral islands which have become historic from the investigations of Forster, Darwin, Dana and A. Agassiz. They rise rather precipitously from depths of between 1,000 and 3,000 fathoms. Only passages of very moderate depth lead from the deep parts of the western Pacific into the Indian Ocean through the archipelago of islands which separates Asia from Australia, but within this archipelago there are several basins which show rather remarkable depths—the China Sea with 2,715 fathoms, the Sulu Sea with 2,550 fathoms, the Celebes Sea with 2,795 fathoms, the Banda Sea with 4,000 fathoms, and the Coral Sea with 2,518 fathoms. The uniformity of these depths appears to indicate that these successive basins were at some remote period parts of a continuous sea and that their separation is due to volcanic eruptions. The discovery within the last thirty years of several areas of local depression in different parts of the Pacific whose depth is far in excess of those of the large basins, also leads to the supposition that they are the result of violent volcanic action. They are found in close proximity to the coast of the mainland or close to chains of islands in the shape of longitudinal depressions, designated as trenches. The deepest one of these trenches is the Guam with 5,269 fathoms (the deepest sounding ever recorded), the Kermadec-Tonga with 5,155 fathoms, the Japan with 4,656 fathoms, the Aleutian with 4,037, and the Atacama, off the coast of Peru and Chile, with 4,175 fathoms depth.

Of the three great oceans the Indian appears to be the least complicated in form, having only one great basin of 3,532 fathoms depth; this is found in its eastern part, in the bight formed by the west coast of Australia and the Great Sunda Islands.

The Arctic Ocean may properly be divided into two parts, separated by Greenland, which descends into the temperate zone to latitude 60°. The eastern part lies north of Europe and Asia and the western part north of America. This ocean was formerly credited with very moderate depths, less than 700 fathoms, this mainly for the reason that the regions earliest known, those just north of the continents, were very shoal, but late Arctic expeditions have shown the existence of a deep trough, 2,650 fathoms between Greenland and Spitzbergen, which is taken as a continuation of that of the Atlantic beyond the Icelandic ridge, and also depths of over 2,000 fathoms far to the eastward and northward of Spitzbergen, indicating the existence of another large basin. In the western part we find at Davis Strait, in about the latitude of the Arctic circle, a barrier of 360 fathoms depth which separates the trough of the western Atlantic



## OCEAN

from Baffin Bay. Except Baffin Bay, which has depths of over 1,000 fathoms, the entire region to the westward as far as Bering Strait seems to be shallow; in Bering Strait the greatest depth is only 28 fathoms.

Since the time of the Antarctic expedition of Wilkes and James Ross (1839-43) the opinion has prevailed that the Antarctic Ocean was one of inferior depth and that a gradual shoaling would have to be expected from the southern parts of the great oceans toward the Antarctic continent. This opinion was based upon the nature of the soundings which Ross took near the newly discovered land and which indicated a rapid shoaling, but has been dispelled by the results of the recent Antarctic expeditions which show depths of over 3,000 fathoms to the southward of Africa in about lat.  $60^{\circ}$  S., 2,975 fathoms between Madagascar and Kerguelen Island, and between the latter and the Antarctic Continent 2,540 fathoms. We are rather interested in the depths existing between the southern capes of the continents and the nearest land to the southward in order to ascertain if any submarine connections exist, such as we have traced between North America and Asia on one side and Europe on the other. Between the Cape of Good Hope and Bouvet Island 2,962 fathoms have been found, between Cape Horn and the New Shetland Islands 2,106 fathoms; there are no soundings between Australia and the Antarctic continent, but rather less than 2,000 fathoms are expected.

*Composition and Density of Sea Water.*—The briny taste and higher specific gravity of sea water than fresh water is due to the presence of salts, held in solution, and although the absolute quantities of these salts are very variable, the relative proportions are always very nearly the same. In 1,000 parts of sea water are found on an average 26.9 parts of chloride of sodium (common salt), 3.2 parts of chloride of magnesium, 2.2 parts of sulphate of magnesium, 1.3 parts of sulphate of lime and 0.7 residue.

The salinity is increased by evaporation on the surface, and although this is supposed to be always active, it is greatly promoted by high temperature and strong dry winds. The salinity is diminished by the addition of fresh water either from rivers, rain or melting ice. The highest salinity is found in the regions of the trade winds with the following results: 37.9 in the North Atlantic, 37.6 in the South Atlantic, 36.4 in the Indian Ocean, 35.9 in the North and 36.9 in the South Pacific, each in 1,000 parts of water. Between these regions of high salinity in approximately latitudes  $20^{\circ}$  to  $30^{\circ}$  both north and south, there is found in the neighborhood of the equator a zone of low salinity, 35.5 to 35.0 in the Atlantic and 34.5 to 34.0 in the Pacific, and this is attributed to heavy rains and weak, humid winds. In the higher latitudes a rapid decrease of salinity is noticed with increase of latitude, except in regions that are reached by the Gulf Stream drift; thus a density of 35 is found beyond lat.  $76^{\circ}$  N. between Spitzbergen and Norway, while in the southern oceans this density is not met with far beyond lat.  $40^{\circ}$  S., and not so far in the North Pacific. The Gulf Stream, which is fed by the highly saline waters which both the north and south trade winds convey to the eastern shores

of North America, has a density at least as high as the North Atlantic in the trade-wind region, while several arms of the sea in the Bahamas have a density greater still.

The greatest densities, exceeding those of the open ocean, are found in land-locked basins in warm and dry climates; thus we find 41 in the Red Sea, 38 in the Persian Gulf, 37 in the Mediterranean. Copious additions of river water reduce the salinity, and for this reason we find low densities along the eastern and Gulf coasts of the United States, and when such waters empty into basins with narrow entrances we observe even lower degrees of salinity, thus 15 to 18 in the Black Sea and from 5 to 8 in the Baltic. Salinity is also reduced by melting ice, as we notice especially in the North Atlantic, where two mighty currents, the East Greenland and the Labrador, carry vast quantities of ice in the shape of bergs and floes from the Arctic regions toward the south. Concerning the vertical distribution of salinity, it has been noticed that it decreases to the depth of 200 to 300 fathoms in those regions where a decided evaporation takes place, like the trade-wind regions, and increases to the same depths where a dilution occurs; that beyond these depths it decreases slowly to the depth of 1,400 to 1,830 fathoms, thence increases again until bottom is reached. In the inland seas, however, the density generally increases as the depth to the bottom.

*Temperatures.*—The rule holds good generally that the mean annual temperature of the surface waters is somewhat higher than that of the air, and that it fluctuates much less. The warmest water is found at the equator, and here the Indian Ocean and the western Pacific exceed in heat the Atlantic and eastern Pacific. From these equatorial regions there is a gradual decrease in temperatures north and south, but the temperatures of northern regions are generally higher than those of the southern in corresponding latitudes for the reason that the warm water which is carried by the southern trades across the equator is replaced by cold water from the Antarctic regions, which is assumed to be the coldest on earth. Furthermore, in the higher northern latitudes the eastern parts of the oceans are warmer than the western, the drift being northeast, and again, the northeast Atlantic is much warmer than the northeast Pacific for the reason that the Gulf Stream is a much more powerful stream than the Kuroshio. The warm waters which we meet at the equator reach to the depth of only about 50 fathoms, the cold waters which we meet beyond that depth are assumed to come from the Antarctic regions. In the regions of the trade winds the surface water, made heavy by evaporation, descends, and hence we find here in depths of from 50 to 250 fathoms the water from  $4^{\circ}$  to  $6^{\circ}$  warmer than in the equatorial regions. But this water moves not only downward, but drifts to greater distances from the equator. The last traces of these tropical waters we find in the bottom layers of the Arctic and Antarctic Oceans; this water has parted with nearly all the heat with which it started on its journey, by supplying cold currents and by melting ice, but still retains enough salt to betray its origin.

From the bottom regions of the Arctic Oceans there is a slow movement of the water toward the equator, and although that from the north

polar regions starts with much lower temperatures, between  $-2^{\circ}$  to  $-3^{\circ}$  C., it rapidly gains heat and shows temperatures of from  $+1^{\circ}$  to  $+2^{\circ}$  C. in middle northern latitudes, while under the equator and in southern latitudes the bottom temperatures do not vary greatly from  $0^{\circ}$  C. This distribution leads to the assumption that the cold waters which in the equatorial regions rise toward the surface, are of Antarctic origin. Theoretically no ice should be formed on the surface of sea water until the whole body of water has been reduced to less than  $-2\frac{1}{2}^{\circ}$  C., but in the Arctic regions freezing generally takes place before this temperature is reached, on account of the slowness of vertical circulation, and warm layers are often found under the surface ice. For seven or eight months of the year the entire Arctic Ocean, with the exception of the southern parts of the Greenland Sea and Baffin Bay, is covered with ice. In the Atlantic, Iceland, the British Islands and the coast of Norway; in the Pacific the Pribilof Islands and Aleutian Islands are free of ice all the year round. Thawing in the Arctic regions commences about the end of May. The arctic summer is rather short, new ice begins to form in September. The discovery of a "northwest passage" from the Atlantic to the Pacific furnished the motive for the greater number of expeditions commencing with those of Cook (1778) and Vancouver (1792-4) on the Pacific side of America, and those of Parry (1819-24) and Ross (1831-3) on the Atlantic side; these undertakings were finally abandoned only after human endurance had been put to its severest tests and many lives sacrificed in the vain endeavor. Nordenskjöld in 1878-9 successfully accomplished the northeast passage by way of the Siberian coast; but the experience of subsequent expeditions teaches that the chances for finding an open passage all the way through are rather uncertain. In the Atlantic two great currents convey the melted ice with its freight of bergs and flocs from the Arctic regions, the East Greenland and Labrador currents. The first one, after following the east coast of Greenland to Cape Farewell, turns north along the eastern side of Davis Strait, crosses over to the western side before reaching Baffin Bay and joins the Labrador current. The latter flows along the Labrador coast, sends a branch through the Strait of Belle Isle; but the principal part passes along the Newfoundland coast and banks, and if not dissipated by the warm waters of the Gulf Stream, dips under it. Here on the southern edge of the Banks of Newfoundland we witness the most rapid change of temperature found in any part of the ocean, in May  $10^{\circ}$ , from  $5^{\circ}$  to  $15^{\circ}$ , within two degrees of latitude, or from the temperature off the coast of Iceland to that off the coast of Spain. There are no arctic currents on this grand scale in the Pacific, the ice generally disappears a short distance south of the Pribilof Islands. In the Southern hemisphere we have a vast region of floe ice the limit of which is lat.  $57^{\circ}$  S. off Cape Horn and  $38^{\circ}$  S. off Cape of Good Hope. The vertical distribution of temperature in enclosed basins is essentially different from that in the open ocean by decreasing from the surface downward to the depth of the channel which opens into the ocean and remaining constant thence to the bottom. Thus in the

Celebes Sea a uniform temperature of  $3.8^{\circ}$  is found between 860 fathoms and the bottom (2795 fathoms), while in the adjoining Sulu Sea, with about the same depth, the temperature is  $10.3^{\circ}$  below 400 fathoms. In the Gulf of Mexico and the Caribbean Sea a uniform temperature of  $4.2^{\circ}$  is found below 900 fathoms, and in the Mediterranean, with a depth of less than 200 fathoms in the Strait of Gibraltar, the temperature from about 270 fathoms to the bottom is  $13^{\circ}$ .

*The Bottom of the Sea* is different in many respects from the surface of the land. The mantle of sea water protects it from subaerial disintegration and erosion which gives such a varied shape to the landscape, and although sea water may decompose the bottom of the ocean, there are no currents strong enough to transport the residue to distant regions. While the land surface is constantly reduced by denudation, the bottom of the sea receives constant accessions. The materials which contribute to this process are either of continental or pelagic origin. The first are either such as the ceaseless actions of the waves remove from exposed parts of the coast or material brought down to the coast by the rivers. The currents carry these materials out to sea, and while the heavier ones, such as gravel and coarse sand, remain near the shore, the lighter ones, as fine sand, silt and mud, are transported to considerable distances before they sink to the bottom. In this way the coast is lined with a fringe of continental deposits which may be quite narrow, but often attains a width of 100 miles or more. This fringe is designated as continental shelf; when broad it has a moderate slope, and is generally assumed to terminate with the 100 fathom curve. It is succeeded by a well defined steeper slope called the continental slope. Continental or terrigenous deposits are often found at considerable distances from the coast, disconnected from the shore deposits; in such cases they are formed by conflicting currents losing their velocity and depositing the sand and silt which they carry. These deposits, called sand banks, often constitute dangers to navigation. In the higher latitudes melting icebergs and flocs produce banks; in this way the large Newfoundland Banks, 270 miles wide, are supposed to have been formed.

The finest terrigenous material, designated as mud, is carried to sea far beyond the 100 fathom limit, and in the shape of blue, red, green, volcanic and coral mud, covers about one seventh part of the ocean's bottom to depths of over 1,000 fathoms. These "muds" also cover the bottom of the large continental basins with the exception of the Gulf of Mexico and Caribbean Sea, and prevail in the Arctic Seas. The continental slope generally descends very gently from the "shelf" to the trough of the sea, but there are instances of quite steep descent; such are met with off the west coast of Europe, Africa, Mexico and South America, also near volcanic and coral islands. But the bottom of the deep troughs and basins nearly everywhere presents the profile of the dead level of a vast plain. Although animal life presents its contribution to the continental deposits in the shape of broken shells of mollusca, etc., they occupy only an accessory position, and it is in the deeper parts of the ocean that they constitute the principal

## OCEAN CABLES—OCEAN CURRENTS

component. Globigerina ooze, composed mainly of the microscopic shells of a genus Foraminifera, covers over one third of the ocean's bottom, it prevails in the medium depths and especially where there are warm currents, like the Gulf Stream. The largest area is found in the Atlantic Ocean; it predominates in the northwestern part of the Indian, but is restricted to the Polynesian Plateau in the Pacific Ocean. A variation of this ooze, which contains large proportions of mollusca shells, principally those of Pteropods, is called Pteropod ooze, and is found on the central ridges of the Atlantic, in depths not exceeding 1,400 fathoms, and also in the Gulf of Mexico and Caribbean Sea. The red clay occupies the greater depths of the ocean, and a larger area than any other deposit, more than one fourth of the earth's surface. It is a genuine clay and assumed to be the result of the decomposition of pumice and other volcanic materials. The absence of shells in this deposit is not thought to be proof of the absence of animal life; apparently the shells have been dissolved by the free carbonic acid of the sea water and absorbed by the latter before reaching bottom. In some of the deepest parts of the Indian and in the eastern Pacific, silicious radiolarian remains are found in such quantities in the red clay that this kind of deposit has been designated radiolarian ooze. See OCEAN CURRENTS; Ooze.

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**Ocean Cables.** See CABLES, SUBMARINE.

**Ocean Currents.** The surface of the ocean is very rarely in a state of perfect rest. We make a distinction between vertical and perceptible horizontal motion; the latter we call *currents*. Near the coast, in channels and estuaries, the currents are referred to a variety of causes, among which the tides are the most important, but in the open sea the winds are recognized as the primary cause of all the great currents. A regular and continuous wind blowing over the surface of the ocean will induce motion in its surface, but the velocity communicated to the water is always far less than that of the air producing it. In consequence of the viscosity of the water the motion of the surface will be transmitted in part to greater or less depth but generally diminishing rapidly below the surface. The rate of this motion in a body of water and the depth to which it penetrates are altogether a question of time, and it has been demonstrated that if the winds act continuously upon an unconfined ocean the entire body of water from surface to bottom will have motion imparted to it. Furthermore, the momentum acquired by the water in motion will carry it on in its course for a considerable time with slowly diminishing velocities, should the wind cease to blow.

The trade winds are those which in the Atlantic and Pacific oceans blow with great regularity all the year round on both sides of the equator in the Northern hemisphere from the northeast and in the southern from the southeast. In the Atlantic the southeast trades are the prevailing winds between the Cape of Good Hope and Rio de Janeiro to the equator, the northeast trades between lat. 12° N. and about lat. 30° N. The two regions are separated by

a region of light changeable winds and calms called the equatorial calms or doldrums. The trade winds induce currents on the ocean's surface called the North and South Equatorial Currents respectively. Their limits approximate those of the corresponding trade winds; the northern lies between lat. 10° and 28° N. and has a mean velocity of 14 miles per day, the southern between lat. 15° S. and the equator and has a mean velocity of 16 miles per day. The South Equatorial Current from about lon. 20° W. passes north of the equator; this may be due partly to the southeastern trades which extend into the Northern hemisphere and partly to the configuration of the South American coast which compels the current to take a northwesterly course. It finally enters the Caribbean Sea through the different passages among the Lesser Antilles; a small portion, however, separates from the main body and moves south, following the South American coast. Between the two Equatorial Currents we find the Guinea Current which belongs to a secondary class, called compensating currents, which always run in an opposite direction to the primary, and are explained by a natural tendency of the water to restore equilibrium disturbed by the primary current. The Guinea Current commences about 35½° W., attains a velocity of 15 miles, and on reaching the coast of Africa near Cape Palmas, passes into the Gulf of Guinea. One part of the waters which the North Equatorial Current conveys to the American shores enters the Caribbean Sea and joins those of the South Equatorial; the other part moves along the Bahamas toward the northwest. The waters which the Equatorial Currents carry into the Caribbean Sea are assumed to acquire their motion partly from the impulse of the trades, partly in consequence of the prevailing easterly winds and to pile up against the western shores. Very little doubt is entertained at present that the current through the Strait of Yucatan into the Gulf of Mexico, which is one of the strongest on record (from 60 to 120 miles per day), is solely due to the difference of level between the Caribbean Sea and the Gulf. But these waters do not tarry in the Gulf of Mexico, its level being in turn higher than that of the Atlantic; they are, consequently, forced toward the Strait of Florida where they find an outlet, enter the Atlantic as the celebrated Gulf Stream, a name first used by Franklin. In the narrowest part of the channel, off Cape Florida, it approaches the coast to within 15 miles, occupies the entire width (40 miles) and depth (482 fathoms) of the channel and attains velocities of 69 to 100 miles per day at the surface. By calculation it has been shown that a current of the velocity of the Gulf Stream requires a difference of elevation of at least 0.7 feet of the Gulf over the Atlantic, which difference agrees very nearly with that found by direct leveling across the Florida Peninsula. After leaving the Straits, the Gulf Stream moves to the northward over a rocky bottom with a depth of 460 to 270 fathoms, and distant from the coast about 100 nautical miles. In lat. 34° it enters the deep water of the ocean, when off Cape Hatteras, it again approaches the coast, being distant only 35 miles and in depths of over 1,500 fathoms. Its temperature there is between 31° C. in summer and 26° C. in winter, having lost only about 3° since

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leaving the Straits of Florida. It is readily recognized by its high temperature and dark blue color, its western edge being especially well defined. It is not a deep current; at the depth of 250 fathoms its temperature is  $10^{\circ}$  C., under its western edge it is  $7.2^{\circ}$ , while under its eastern edge a temperature of  $15.6^{\circ}$  is found. This appears to indicate that it moves over a wedge of cold water which comes from the north and west and descends toward the east into the depths of the ocean. The width of the Stream off Hatteras is about the same as in the Straits of Florida, 40 miles, and its velocity is between 50 and 73 miles per day. After leaving Cape Hatteras it gradually changes its north-east direction into due west with constantly diminishing velocity and temperature until it reaches the southern edge of the Banks of Newfoundland which it does in summer in lat.  $42\frac{1}{2}^{\circ}$  N. and in winter in  $41\frac{1}{4}^{\circ}$  N., with temperatures of  $22^{\circ}$  C. and  $10^{\circ}$  C. respectively and velocity of 24 to 30 miles per day. It is here no longer considered as an ocean current but a drift, and is called the Gulf Stream drift. The deflection of the Gulf Stream toward the east is attributed partly to the rotation of the earth and partly to the direction of the prevailing winds. While the central part of the Gulf Stream drift makes its way toward the western shores of Europe and moderates their climate, one part enters Davis Strait and produces an open channel to the southern part of Baffin Bay during winter; another one passes into Denmark Strait between Iceland and Greenland, but it soon sinks into the depths of the sea. A more persistent branch passes between Iceland and the British Islands and the coast of Norway, and has been traced to the eastward as far as the west coasts of Spitzbergen and Nova Zembla during the summer season. The southern part of the Gulf Stream drift, more properly called Atlantic drift, leaves the main body south of the Azores and, as the North African Current, follows the coast of Africa to Cape Blanco where it joins the North Equatorial Current. The vast oval-shaped area enclosed by the North Equatorial Current, the Gulf Stream and the Gulf Stream drift is one of calms and weak drifts, and is called the Sargasso Sea from the sea-weed which accumulates about its borders.

Turning to the currents that descend from the polar region into the Temperate zone, we find in the removal of vast bodies of water from the western part of the ocean to the eastern by the Gulf Stream the cause of other currents, compensating currents, whose function it is to move waters in the opposite direction, from the northeast to the southwest, for the purpose of restoring equilibrium, as in the Labrador current. The prevailing north-westerly winds in Baffin Bay assist such a movement along the coast of Labrador and Newfoundland to the southward, and this direction is maintained until Cape Race has been passed where it is changed to southwest on account of the rotation of the earth. This current is active during the season of melting ice. Field ice generally appears on the Banks as early as February and disappears about the end of May. Icebergs are most abundant in May and are found in diminishing numbers until the end of August. The majority of bergs come from the west coast of Greenland (some few come from

Frobisher Sound and Hudson Strait), and move at the rate of about 10 miles per day. Similar conditions to those existing in Baffin Bay produce a southerly current along the east coast of Greenland, called the Greenland Current, which rounds Cape Farewell and turns to the northward toward the depression which the Labrador Current has created in Baffin Bay. After skirting the ice barrier which usually exists in Davis Strait in the spring, it merges into the Labrador Current. The temperature of these currents is very low, but their density is comparatively high for the reason that they are shallow and rest on warm and heavy waters and have been constantly gaining salt during their progress. Being comparatively heavy the Labrador Current sinks under the Gulf Stream. The cold waters which extend along the western edge of the Gulf Stream as far as Cape Florida have sometimes been considered a continuation of the Labrador Current, but it appears that the movement of these waters toward the southwest is extremely slow and disguised by the more powerful motion produced by the winds and tides. Furthermore, the movement of this littoral band is retarded by warm currents making their way into the Gulf of Saint Lawrence and Gulf of Maine. In conformity with the laws of oceanic circulation as now understood, the waters of the Labrador Current as well as the cold waters of the coast regions pass beneath the edge of the Gulf Stream (which is very thin) and continue to sink and move along the slope of the continental plateau as they drift slowly southward until they reach the bottom of the ocean with a temperature of  $2.2^{\circ}$ . The existence of a cold wall along the western edge of the Gulf Stream and cold bands within its limits, which were discovered by the early Gulf Stream explorations and which have since been denied and re-affirmed, can hardly be considered as permanent features; similar bands are often noticed in thin superficial currents and are the consequence of underlying cold water being forced to the surface either by lateral pressure or by the sinking of the warm water by reason of evaporation or loss of heat.

That part of the South Equatorial Current which turns to the southward off Cape San Roque, called the Brazilian Current, is quite weak, having a velocity less than 20 miles per day; off the Falkland Islands it is joined by the Cape Horn Current which comes from the southern Pacific and crosses the South Atlantic. When off Cape of Good Hope this "Westwind drift" turns to the northward and as a cold current, the Benguela Current, flows along the west coast of Africa with a velocity of 12 to 20 miles per day. Off the mouth of the Kongo it turns to the westward and joins the South Equatorial.

The currents of the Pacific are similar to those of the Atlantic. The North Equatorial has its origin near the Revillagigedo Islands off the coast of Mexico, in lon.  $110^{\circ}$ , flows between the lats. of  $10^{\circ}$  N. and  $20^{\circ}$  N. in a westerly direction across the entire width of the ocean to the Philippines, about 7,500 miles, with a velocity of 12 to 18 miles per day. The South Equatorial extends from lat.  $15^{\circ}$  S. to the equator and has its greatest velocity near its northern edge. It has a mean velocity of 24 miles per day, but this, is often more than doubled in the eastern part. In the neighbor-

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hood of the Fiji Islands it divides, one part, the northern, known as the Rossel Current, passing through the various passages among the Polynesian Islands toward Torres Strait and the north coast of New Guinea; the southern branch, called the Australian Current, trends toward the east coast of Australia with a velocity of 24 miles, but gradually loses strength and is deflected toward the southeast. The Equatorial Counter-Current, setting toward the east, commences at Mindanao in the Philippines and extends to the Bay of Panama and is especially strong during the period from June to October. The Japan Current, or Kuroshiwo, is a continuation of the North Equatorial and is the Gulf Stream of the Pacific. Starting from the east coast of Luzon, it passes the east coast of Formosa; changing its course to the northeast, and makes for the southwestern point of Japan. Off this point the current divides, the major portion passes through Van Diemen Strait and the passages between the Linschoten Islands, and runs parallel to the south shores of the Japanese Islands, attaining its greatest velocity of 48 to 72 miles per day. It leaves the coast of Japan after having reached Cape Maboye, to the eastward of Yokohama, and turns to the northeast, like the Gulf Stream off Cape Hatteras, without, however, reaching beyond the latitude of  $40^{\circ}$  N. One branch of the Kuroshiwo parts from the main stream before Van Diemen Strait has been reached, enters the Japan Sea through the Korea Channel and follows the west coast of Japan to La Perouse Strait, through which it passes into the Okhotsk Sea and flowing along the west shores of the Kurile Islands it can be traced to the west shore of Kamchatka Peninsula. The strength of the Kuroshiwo is greatly influenced by the winds of the western Pacific; during the summer months, between the middle of May and the beginning of October, the southwest monsoon blows on the coast of China to lat.  $25^{\circ}$  N., and is followed during winter by the northeast monsoon which retards the stream, hence it has its greatest strength in August and its least in March when it is hardly recognized as a warm stream. It is an open question whether a branch of the Kuroshiwo enters the Bering Sea. The currents here are so feeble and so much influenced by the winds and tides that their record does not convey any definite information; but from the fact that the southwestern, or deeper, part of this sea is always free of ice while the northeastern, or shoaler part, during the winter months is covered with an impenetrable mass of ice we may safely conclude that warm water from the Pacific enters the sea, if not as an active current, at least as a powerful drift. In confirmation of this supposition we find in the deeper parts of the sea during August a mean surface temperature of  $7.4^{\circ}$ , at the depth of 100 fathoms a minimum of  $2.9^{\circ}$ , at 200 fathoms a maximum of  $3.4^{\circ}$ , and at 1,000 fathoms  $1.9^{\circ}$ , with salinity increasing regularly from surface to bottom. The breaking up of the ice for some distance northward of Bering Strait indicates that a portion of the current passes through the strait. In lon.  $150^{\circ}$  W. the Kuroshiwo can no longer be considered a warm current, it thence gradually assumes a more southerly direction and passes the coast of California as a cold current, the California Current, and finally merges into the

North Equatorial in about lon.  $130^{\circ}$  W. The east Australian Current, corresponding to the Brazilian of the Atlantic, is regarded as a warm current; it has a width of 40 miles, with its inner edge about 20 miles off shore, and shows velocities of from 12 to 72 miles. South of Tasmania and New Zealand we find the same westerly winds and easterly drift that we noticed in the South Atlantic. On reaching the South American coast a branch of this drift turns to the northward past the coast of Chile and Peru and joins the South Equatorial southward of the Galapagos Islands. This current has a velocity of only 15 miles and is generally supposed to produce the comparatively low temperatures prevailing along the west coast of South America, but these are more correctly attributable to the cold water which rises from the bottom to the surface near the coast. There are no arctic currents in the Pacific on the grand scale of the Labrador, no icebergs, and the ice in Bering Sea is not very compact. In fact the trips over the ice by the natives of both Asia and America in the depth of winter to visit their kinsfolk on Diomed Island, in the middle of Bering Strait, are considered hazardous ventures. The ice in winter extends from Bristol Bay to some miles to the northward of Saint Paul Island, thence northwest to Cape Navarin, in the summer months, August, September and early October the arctic pack ice extends from Icy Cape on the coast of Alaska to Herald Island. Floating ice is found as far south as 35 miles to the southward of the Pribilof Islands and to about  $60^{\circ}$  lat. off the coast of Kamchatka. Along this coast there is a cold current in spring and early summer, this is reinforced by cold water which by strong tidal currents may reach the eastern shores of the Kurile Islands through Amphitrite and other straits from Okhotsk Sea. This cold current, the Kurile Current, carries quantities of arctic ice, and is noted for its low temperatures from surface to bottom. It follows the east coast of Japan as far as Van Diemen Strait, is interposed between the shore and the Kuroshiwo and is known as Oya Siwo (green water).

The Indian Ocean shows different conditions from those of the two other great oceans for the reason that its northern limit is within the Torrid zone. During the summer months the southeast trade winds pass the equator and are changed into southwest winds or southwest monsoon. During the rest of the year, from October to April, the northeast monsoon, which corresponds to the northeast trade winds of the other oceans, blows over the northern part of the ocean. During this period the currents north of the equator have a northwesterly direction, attaining especially great velocities off Ceylon (80 miles) and the east coast of Africa. During the southwest monsoon the water north of the equator moves in the opposite direction, from west to east toward Sumatra, and again attains its greatest velocity off Ceylon. In the Southern hemisphere between the latitudes of  $7^{\circ}$  and  $20^{\circ}$  S. the Equatorial Current flows to the west during the whole year with velocities of between 12 and 36 miles, sometimes as much as 60 miles. Off the east coast of Madagascar the current divides into a northern and southern branch. A part of the northern branch turns to the northwest, reaching the Bay of Zanzibar during the southwest monsoon

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and turning into the Equatorial Counter-Current during northeast monsoon. The other part rounds the northern Cape of Madagascar with velocities of 18 to 48 miles and enters the Mozambique Channel as the Mozambique Current. During the northeast monsoon the Equatorial Counter-Current is found between the equator and lat. 7° S. with velocities of from 12 to 18 miles. Its function is to restore the equilibrium by carrying back part of the waters removed by the Equatorial Currents from the eastern part of the ocean. During the southwest monsoon the eastern flow extends over the whole ocean north of lat. 5° S., with velocities of more than 48 miles at the equator. The Agulhas Current is a continuation of the Mozambique Current; it has a velocity of 46 to 51 miles and off Cape of Good Hope meets the cold waters from the vicinity of Cape Horn. The collision of the two currents produces streaks of alternate warm and cold water, differing 8° or more in temperature, a feature which has attracted the attention of many navigators.

The most noticeable feature of the currents in the Arctic Ocean is the almost universal eastward and southeastward set north of the American Continent and the generally westward set north of Siberia, although at a considerable distance from the mainland. Both currents seem to originate north of Bering Strait, and the fact that they set out from this locality in nearly opposite directions has suggested the existence of a large island or continent between the Pole and Bering Strait.

In the Antarctic regions, or rather those to the southward of Tasmania, Cape Horn and the Cape of Good Hope, the drift is generally from west to east, in conformity with the prevailing westerly winds.

In conclusion it may be of interest to notice one or two currents which in a strict sense may not be considered ocean currents but which may explain the function of difference of density in the production of currents. In the Mediterranean we have noticed a higher density in consequence of evaporation than is possessed by the adjoining ocean. In consequence of this difference there is a surface inflow of ocean water with a velocity of 48 to 72 miles and an undercurrent of the denser water into the ocean. On the other hand the density of the Baltic is less than that of the adjoining North Sea, hence we have a surface current from the Baltic into the North Sea and an undercurrent in the opposite direction.

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**Ocean Grove, N. J.**, town in Monmouth County; on the Atlantic Ocean, and on the Central of New Jersey and the Pennsylvania Railroad; about 30 miles south of New York. It is a famous summer resort on account of its fine beach and the ease of access from New York, Philadelphia, and other cities. It adjoins Asbury Park (q.v.); Wesley Lake is on the boundary. The Ocean Grove Camp Meeting Association of the Methodist Episcopal Church controls the town, and regulates its laws. The sale of intoxicants and tobacco and theatrical performances are prohibited. The Sunday laws are strict and rigidly enforced. The prominent buildings are the Auditorium, which seats 10,000 persons, cost \$75,000, and was dedicated 9 Aug. 1894; the public school building, and the post-office. Religious meetings are held in the Auditorium. The school building, called the Neptune Township High School, cost \$72,000. The association owns and operates the electric light plant and the waterworks. The association was organized in 1869; but the first permanent building was not erected until 1875, a wooden frame covered with green boughs was its appearance when first used. In 1874 a stand for the speakers had been erected, and the audiences sat on temporary seats made by placing planks on trestles. There are several large hotels and boarding houses and a large number of summer cottages. In the summer months the population varies from 20,000 to 30,000. The winter population is less than 5,000.

**Oceana, ô-shê-â'nâ,** or **England and Her Colonies**, a work of travel by James Anthony Froude, published in 1886. This is the record of a journey made by the author via Cape Town to Australia and New Zealand, and home by way of Samoa, the Sandwich Islands, San Francisco, Salt Lake, Chicago, and New York, in 1884-5.

**Oceanic Life.** See BENTHOS; DEEP SEA EXPLORATION; FISHES, GEOGRAPHICAL DISTRIBUTION OF; GLOBIGERINA OOE; PLANKTON; SEAWEEDS; ZOOGEOGRAPHY; etc.

**Oceanica, ô-shê-ân'î-ka,** or **Oceania**, the name given to the land division of the world which is composed of islands in the Pacific Ocean. The limits of Oceanica are not well defined; some geographers include in this division all the oceanic islands in the Pacific, others include the East Indian Archipelago. A subdivision of Oceanica adopted by many is into Western Oceanica or Malaysia, corresponding with what is better known by the name of the Malay Indian or East Indian Archipelago, Micronesia or Northern Oceanica, Polynesia or Eastern Oceanica, and Melanesia or Southern Oceanica. The islands and peoples of Oceanica will be found described under their respective titles.

**Oceanids**, in Greek mythology, a class of nymphs, daughters of Oceanus and Tethys



## OCEANUS — OCMULGEE

They were 3,000 in number, and were said to have an equal number of brothers. See MYTHOLOGY.

**Oceanus**, ō-sē'a-nūs, in Greek mythology, the eldest of the Titans, and a personification of the sea. He was called the son of Gæa (the earth) and of Uranus (heaven). Oceanus and Tethys were the parents of rivers, and of the race of goddesses called Oceanids (q.v.). According to another account he was the father of all gods and men. The physical idea attached by the Greeks to the term Oceanus, was that the earth was a flat circle surrounded by a river (Oceanus), out of which the sun and stars were supposed to rise and set, and on whose banks were the abodes of the dead. The term ocean was thus applied especially to the Atlantic, or sea beyond the Pillars of Hercules, in contradistinction to the Mediterranean or internal sea.

**Ocel'us**, a structure found in various groups of invertebrate animals, consisting of a spot of pigment enclosed in a capsule or cavity, generally supplied with nerve-filaments, and to which the function of sight is attributed. See EYE.

**Ocellus** *Lucanus*, ō-sēl'ūs lū-kā'nūs, a Pythagorean philosopher: b. Lucania, Italy, 5th century B.C. His works are: 'On Law'; 'On Kingly Rule and Piety'; and 'On the Nature of the Whole' (Περὶ τῆς τοῦ παντὸς φύσεως) the last of which is the only one of his treatises now extant, excepting some fragments found in Stobæus, written in Doric. 'On the Nature of the Whole' is in Ionic, which fact leads some critics to doubt its authenticity. It is divided into four chapters, in which the author maintains that the whole, that is, Nature, the Universe, has no beginning nor end, and that men have always existed. Consult: Mullach, 'Fragmenta Philosophorum Græcorum' (1860); Taylor, 'Ocellus Lucanus,' translated into English (1831).

**Ocelot**, ō'sē-lōt, a tropical American wild-cat (*Felis pardalis*), averaging about three feet in length exclusive of the tail, and about 18 or 20 inches tall. Its body color is a variable and handsome fawn or grayish-brown, marked with lines of blackish ring-spots. The ocelot ranges northward as far as Louisiana, and is found in forests, where it preys largely upon birds. It is commonly seen in menageries, and in Mexico is often found in a semi-domesticated condition about farm-houses.

**Ochakof**, ō-chā'kōf, or **Otchakoff**, Russia, a town in the government of Cherson, on the black Sea, at the mouth of the Dnieper, formerly an important Turkish fortress, with a citadel, the walls of which were 25 feet high. In 1737 it was stormed by the Russians, who lost 18,000 men in the attack. The Turks attempted to recover it with a force of 70,000 men, but were repulsed with the loss of 20,000. In 1738 it was given up by the Russians, who had previously destroyed the works. The Turks fortified it anew in 1743, and held it until 1788, when, after a siege of six months, it was stormed by Suvaroff, who razed it to the ground. By the Peace of 1792 it was ceded to Russia. It has modern fortifications, and some coasting trade. Pop. about 13,000.

**Ochil Hills**, Scotland, a mountain range on the borders of Perth, Clackmannan, Kinross,

and Fifeshire; average breadth, about 12 miles; highest summit, Bencleuch, in the southwest, about 2,300 feet above sea-level. The Ochils are of basalt and greenstone, and contain copper and iron ores.

**Ochre**, ō'kēr, or **Ocher** (Greek, "yellow," "yellowish green," "pale"), friable clay with an admixture of iron oxides, giving it a color varying from yellow to red, as the iron peroxide is hydrated (yellow) or anhydrate (red). The reddish color may be deepened artificially by burning. Rarely manganese takes the place of iron in the composition of ochre, or occurs in addition to iron, the brownish variety thus formed being called "Sienna" (from its famous source in Italy) or "umber" (Latin, *umbra*, "shade"). The coloring of these two shades again is deepened by their being burnt. UMBER and sienna are largely found, outside of Italy, in New York, Pennsylvania, Missouri, and Tennessee; and the leading States in the production of ochre are Pennsylvania, Georgia, California, and Vermont. But the United States produces less ochre and iron oxide pigments than France or Germany. Until recently the home product was inferior to the foreign, being only 50 per cent pure, a fault now remedied by specially designed crucible furnaces, which insure the purity of the increased output. The best yellow ochre is that coming from Oxford, England.

**Och'ro**, same as Okra (q.v.).

**Ochs**, ōks, **Adolph S.**, American publisher: b. Cincinnati, Ohio, 12 March 1858. His early life was that of a country lad, and he obtained a common school education at Knoxville, Tenn., where for a year he served as carrier and news-boy. In 1871 he was grocer's clerk at Providence, R. I., attending a night school meanwhile. He then returned to Knoxville, where he was a druggist's apprentice for a year and then a printer in 1873. In 1878 he became publisher of the *Chattanooga Times*, where his ability was distinctly shown. In 1896 he secured a chief interest in the *New York Times* and as its publisher developed its resources; his purchase of the *Philadelphia Times* and the *Public Ledger* followed in 1902.

**Ochtman**, āk'man, **Leonard**, American artist: b. Zonnemaire, Zeeland, Holland, 21 Oct. 1854. He settled in Albany with his family in 1866, and became a draughtsman in an engraving office; had a studio at Albany for two years and subsequently took a winter course at the Art Students' League, New York. As a landscape painter he is self-taught, but has traveled through England, France, and Holland for the purpose of study. His power and skill are shown in such paintings as 'Night on the Mianus River'; 'Autumn Moonlight'; 'Moonlight Night in Spring'; 'A Morning Symphony.' Vivid color, depth of imagination and breadth of treatment characterize his paintings whose truthfulness reveals a genuine love of nature in their author.

**Oc'imum**, a genus of plants. See BASIL.

**Ocmulgee**, ōk-mūl'gē, a river in Georgia which has its rise north of the central part of the State, flows south, southwest, and east, uniting with the Oconee to form the Altamaha. It flows through an agricultural region; its length is about 260 miles. The upper course has many

rapids and small cascades, and the lower course is through a more flat country, covered with pine forests. It is navigable for small steamers for about half its distance from the mouth, to Macon (q.v.).

**Oconee**, ô-kô'nê, a river in Georgia which has its rise in Hall County, flows southeast and unites with the Ocmulgee to form the Altamaha. It is navigable for about 100 miles from its mouth. Milledgeville, formerly the capital of the State, is on the Oconee.

**O'Connell**, ô-kôn'el, Daniel, Irish patriot: b. Cahir, County Kerry, Ireland, 6 Aug. 1775; d. Genoa, Italy, 15 May 1847. He studied in France at the colleges of Saint Omer and Douay, and in 1793, on his return home, began the study of law. In 1798 he was admitted to the bar, and soon began to distinguish himself both by legal skill and oratory. After a speech made at Dublin in the beginning of 1800, at a meeting held to petition against the union, he was regarded as one of the most promising and energetic of the Catholic leaders. The question of Catholic emancipation being seriously agitated, he was active in every attempt to remove the national grievances, and in 1824 founded the Catholic Association which carried on active agitation in spite of government measures against it. The chief grievance was the Catholics could not sit in Parliament without taking an oath contrary to conscience; in 1828 O'Connell took a decisive step by becoming candidate for Parliament in the county of Clare; he was elected but could not take his seat because he refused to take the preliminary oath. His election, however, was a fact that could not be ignored, and as the feeling in favor of emancipation continually increased, the ministry with the Duke of Wellington at its head decided they must concede it, or risk a civil war. In 1829 therefore the Catholic Emancipation Bill was passed, and under its provisions O'Connell took his seat, and became the leader of the Irish party in the House of Commons. While carrying on this agitation he could hardly avoid making a considerable sacrifice of his practice as a lawyer, and was for many years the annual recipient of a large sum contributed by his countrymen. In 1842 he began the agitation for the repeal of the union between Great Britain and Ireland, holding monster meetings at which he was the chief speaker; in 1843 he was arrested on a charge of conspiracy and sedition; he was convicted and sentenced to fine and imprisonment, but the House of Lords reversed the judgment on 4 Sept. 1844. He then resumed his seat in Parliament, but his influence was lessening as a new Irish party had arisen — called Young Ireland — which advocated more radical measures, and did not favor O'Connell's "moral force" policy; in 1846 he supported the Whig ministry which still further alienated him from the younger party. His health was failing, and in 1847 he went to Italy, intending to visit Rome, but died at Genoa. He was a most eloquent and forceful speaker, and a leader greatly beloved by his people.

Consult: Cusack, 'The Liberator, his Life and Times' (1872); Dunlop, 'Life of Daniel O'Connell'; Fitzpatrick, 'Correspondence of Daniel O'Connell' (1888); McCarthy, 'History of Our Own Times'; O'Connell (his son), 'Life and Times of Daniel O'Connell' (1846); Wendell Phillips, 'Daniel O'Connell.'

**O'Connell**, William Henry, American Cardinal: b. Lowell, Mass., 8 Dec. 1850. He was graduated from Boston College A.B. 1881, and studied theology at the North American College, Rome, Italy, 1881-84. He was ordained priest at Rome, 8 June 1884 and was appointed rector of the North American College, 21 Nov. 1895. He was named a domestic prelate in 1897, and on 22 April 1901 was appointed bishop of Portland, Maine. He was consecrated at St. John Lateran, Rome, 19 May 1901 and returning to the United States, he at once entered upon the duties of his diocese, having been installed in the Cathedral at Portland, Maine. He was honored with the title of assistant at the Pontifical Throne in Jan. 1905, and was a special Papal envoy to the Emperor of Japan in 1905, at which time he was presented with the Grand Cordon of the Sacred Treasure by the Mikado of Japan. He was elevated to the archbishopric and named coadjutor to Bishop Williams of Boston, Mass., on 8 Feb. 1906, his title being archbishop of Constance, and on the death of Bishop Williams, he succeeded to the see of Boston, 30 Aug. 1907. He was created cardinal by Pope Pius X, 30 Nov. 1911.

**O'Connor**, ô-kôn'or, Arthur, Irish political leader: b. Mitchelstown, County Cork, Ireland, 1763; d. near Nemours, France, 25 April 1852. He was admitted to the bar in 1788, was elected to the Irish Parliament, and as a member of the United Irishmen served as one of their directory of five, in consequence of which he was tried for high treason, but finally discharged. He went to France and on his return to Ireland was again arrested, but made his escape and entered the service of Napoleon, who made him a lieutenant-general in 1804 and later general of division. He published: 'Letters to Earl Camden' (1798); 'The Present State of Great Britain' (1804); etc.

**O'Connor**, Jôhn, Canadian jurist: b. Boston, Mass., January 1824; d. Coburg, Ont., 3 Nov. 1887. He removed with his parents to Canada in 1828 where he was educated, and in 1854 admitted to the bar. He sat for Essex in the Canadian parliament 1867-72, and in the last named year was president of the council in Sir John Macdonald's administration. Later he was minister of inland revenue and postmaster-general, and became queen's counsel in 1873. In 1878 he was reappointed president of the council and in 1880 became a second time postmaster-general, was secretary of state for a time, and in 1881 re-assumed the office of postmaster-general. He was a commissioner for revising the statutes of Canada and Ontario, and in 1884 was appointed judge of the high court of justice of Ontario.

**O'Connor**, John Joseph, American Roman Catholic bishop: b. Newark, N. J., 11 June 1855. He was educated at Seton Hall College, in the American College at Rome, at Paris, and in 1877 he was ordained to the priesthood. Professor of Philosophy and Theology, Seton Hall College and Seminary, 1878-95; pastor St. Joseph's Church, Newark, 1895-1901; consecrated Bishop of Newark, N. J., 25 July 1901.

**O'Connor**, Thomas Power, Irish journalist and politician: b. Athlone 5 Oct. 1848. He entered journalism in Dublin, went to London in

1870, was for a time in the London office of the New York *Herald*, entered Parliament for Galway in 1880, and has represented the Scotland division of Liverpool from 1885. He founded and edited *The Star*, *The Sun*, and the 'Weekly Sun,' and later became editor of 'M. A. P.' (Mainly About People). His works include a biography of Beaconsfield.

**Oconomowoc**, ô-kôn'ô-mô-wôk, Wis., city in Waukesha County; on the Chicago, M. & St. P. railroad; about 25 miles west by north of Milwaukee. It is in the midst of a region of beautiful lakes, the largest of which are Belle and Fowler, and it is noted for the good fishing in the vicinity. Fertile farm lands are in this part of the State, and the industries of the city are connected chiefly with farm and dairy products. The city owns and operates the electric-light plant and the waterworks. Pop. 3,100.

**O'Connor**, ô-kôn'ôr, Charles, American lawyer and politician: b. New York 22 Jan. 1804; d. Nantucket, Mass., 9 Feb. 1884. He studied law, was admitted to the bar at 20, and soon became one of the leading lawyers of the country; the Forrest divorce suit, the Slave Jack case (1835), the Lispenard will case (1843), and the Jumel case (1871) were the most important litigations he took part in before the great Tweed suits in which he acted for the prosecution with William M. Evarts and W. H. Peckham. O'Connor wrote 'Peculation Triumphant,' a record of the Tweed ring. A Southern sympathizer during the War, he went bail for Jefferson Davis together with Horace Greeley. In 1872 he was nominated for the presidency by the wing of the Democracy opposed to the nomination of Horace Greeley; he refused the nomination, but polled nearly 30,000 votes. In 1876 O'Connor acted as counsel for Samuel J. Tilden before the electoral commission.

**O'Connor, John Francis Xavier**, American educator: b. New York 1 Aug. 1852. He was graduated from St. Francis Xavier College in 1872, continued his studies in Europe, entered the Society of Jesus, and was ordained to the Roman Catholic priesthood in 1885. He has been a professor in West Park College, Georgetown University, Boston College, and St. Francis Xavier College, and has lectured on art, music, and Assyrian inscriptions. He has written: 'Lyric and Dramatic Poetry' (1883); 'Jesuit Missions in America' (1892); 'Christ, the Man of God' (1900); 'Education in the Schools of New York' (1901); etc.

**Oconosto'ta**, a Cherokee Indian chief: b. about 1708; d. 1810. He was one of the six delegates who in 1730 visited King George II. He was for many years an ally of the British, his one act of treachery being so severely punished that he ever afterward maintained their friendship. Oconostota in 1768 signed a treaty of peace with the Iroquois who had been his life-long enemies. He took no active part in the Revolutionary War, being infirm and a semi-invalid. He resigned his chieftship in 1782 in favor of his son. See **CHEROKEES**.

**Oconto**, ô-kôn'tô, Wis., city, county-seat of Oconto County; at the mouth of the Oconto River, on Green Bay, and on the Chicago, M. & St. P. and the Chicago & N. W. R.R.'s; about 30 miles north by east of the city of Green Bay.

It was settled in 1850 and in 1882 was incorporated. It is in an agricultural and lumber region and has considerable trade in farm and dairy products, also in fish and lumber. Its chief industrial establishments are flour and lumber mills, canneries, creameries, a brewery, and a wagon factory. It has a good public library, a high school, court-house, and a number of fine residences. Pop. (1910) 5,629.

**Oco'tea**, a genus of tropical trees of the mountain-laurel family (*Lauracea*, q.v.), the wood of which is strongly and usually disagreeably scented. Prominent species are the stink-wood (*O. bullata*) of the Cape of Good Hope; til-wood (*O. fatens*) of Madagascar, and the cinnamon-yielding *O. cupularis* of Mauritius. Some of these trees yield valuable timber.

**Ocracoke** (ô'kra-kôk) Inlet, on the coast of North Carolina, between the islands of Portsmouth and Ocracoke, and forming a passage from the Atlantic into Pamlico Sound. Just at the western end of the inlet is a lighthouse, and on each side are dangerous shoals. Cape Hatteras is about 20 miles northwest.

**Oc'rea**, among the ancient Romans, a legging covering the foreleg from the knee to the ankle. It was made of tin, bronze, or other metal, modeled to the leg of the wearer, and fastened behind by straps and buckles, and generally richly ornamented.

**Oc'tagon**, in geometry, a polygon of eight angles or sides. A regular octagon is an octagon all of whose sides and angles are respectively equal to each other. See **GEOMETRY**.

**Octahe'drite**, dioxide of titanium in the crystal form, so called because of its tetragonal crystallization; sometimes styled *Anatase*. Its chemical composition ( $Ti_2O_3$ ) is that of the amorphous rutile and Brookite. Octahedrite is yellow, brown, gray, blue, or black; has a quasi-metallic lustre; is unaffected by acids and infusible with blowpipe; becomes incandescent if gradually heated; has a density of 3.83 to 3.93; and a hardness of 5.5. It occurs in the granite fissures of Switzerland, of Dauphiné at Bourg d'Oisans (whence the French name Oisanite), of the Brazilian diamond fields, and in the United States in Burke County, N. C., and Smithfield, R. I.

**Octahe'dron**, in geometry, a solid contained by eight equal and equilateral angles. It is one of the five regular bodies. See **GEOMETRY**.

**Oc'tana**, the "Octant," in astronomy, the constellation surrounding and including the South Pole of the heavens, and one of the 14 added to the heavens by Lacaille in connection with his work at the Cape of Good Hope.

**Oc'tant**, in astronomy, an instrument, is the eighth part of a circle divided into degrees, and used in calculating the amplitude of the stars, but is now little used.

**Oc'tave**, the eighth day after a festival, and the intervening days, all of which partake of the nature of the festival. In the Roman Catholic Church octaves are privileged and non-privileged, with many degrees and subdivisions of the former. The octaves of Easter and Pentecost are specially privileged. In the octave of Epiphany only the feast of patron saint, title or dedication of a church may be kept, and that not on the eighth or octave day, on which the

## OCTAVE IN MUSIC—OCTOPUS

services of the festival are to be repeated. In the Church of England the only festivals mentioned as having octaves are Christmas Day, Easter Day, Ascension, and Whitsunday. Dr. Sparrow, in the 'Rationale,' says that our whole life being spent in the revolution of seven days, the eighth or octave signifies eternity. On the other hand Du Cange declares that the eighth day denotes a finished solemnity, inasmuch as our Lord's resurrection took place on the eighth day, counting the period of his Passion as beginning on one Sunday, when he entered Jerusalem in triumph, and ending on the next, when he rose in triumph from the grave.

**Octave in Music.** See HARMONY.

**Octavia**, Roman matron, wife of Mark Antony, the triumvir, and sister of Octavian, or Augustus: d. 11 B.C. She was married (before 54 B.C.) to Gaius Claudius Marcellus, who became consul in 50 B.C. Julius Cæsar, her great uncle, wished to divorce her from Marcellus so that Pompey might marry her and thus be as closely bound to him as he had been during the life of Julia, his first wife and Cæsar's daughter; but Pompey and Marcellus both objected. After Marcellus' death in 41, however, she was married to Mark Antony, thus cementing the bond between him and her brother Octavian, the future Augustus. Antony's passion for Cleopatra and his complete enslavement to her in spite of the remarkable beauty and matchless virtue of Octavia had much to do with precipitating the war between Antony and Octavian. She was actually divorced by Antony in 32 B.C., but cared tenderly for her children after his death. Her son by Marcellus was Marcus Marcellus, adopted by Augustus as his heir; he died prematurely in 23 B.C. bitterly bewailed by his mother and pathetically sung by Virgil in the sixth *Æneid*. Her daughters by Antonius became, respectively, the grandmother of Nero, and the mother of Caligula. The porticus Octaviæ, built in her honor by Augustus, enclosed the temples of Jupiter Stator and of Juno.

**Octavia**, Roman empress, wife of the Roman emperor Nero: b. 42 A.D.; d. Pandataria 62 A.D. A daughter of the emperor Claudius and of Messalina (thus a grand-daughter of Octavia, the wife of Antony); she married in 53 her cousin, Nero, then only 16. He was soon unfaithful to her, first leaving her for Acte, a freedwoman, and then for Poppæa Sabina, whom he married in 62, only 16 days after his divorce from Octavia. But Octavia's popularity was so great that Nero was forced to recall her to Rome, where she was so enthusiastically received as to rouse the jealousy of Poppæa. She was exiled to Pandataria on a false charge of infidelity, and was there killed by Nero's emissaries. A tragedy, telling her story and bearing her name, was long attributed to Seneca; its author may have been Curiatius Maternus, but it is still printed among Seneca's plays.

**Octavianus.** See AUGUSTUS.

**Octavo**, in printing, the size of a sheet of paper, which has been folded so as to make eight leaves; hence, applied to a book printed with eight leaves to the sheet. It is generally written 8vo, and varies in size according to the sizes of paper employed; as, foolscap octavo

(or 8vo), imperial octavo (or 8vo), etc. See PAPER.

**October**, the tenth month of the year, originally the eighth month in the Roman calendar, whence its name, which it still retained after the beginning of the year had been changed from March to January. An old name in Germany for October was "wine month." It has long been in England the principal month for brewing. See CALENDAR.

**October States**, in American political history, certain States like Ohio and Indiana, whose elections were held in October instead of November. In presidential years these October elections had peculiar bearing on National results in November.

**Octoic Acid**, or **Caprylic Acid**, an organic acid having the chemical formula  $C_8H_{16}O_2$ , or  $C_7H_{15}CO.OH$ , and occurring, in the form of a glyceryl ether, in common butter, and also, in much larger quantities, in cocoanut oil. It may be obtained in the form of white crystals, which melt at 63° F. Octoic acid is almost insoluble in cold water, but dissolves in boiling water. Various isomers and compounds of the acid are known, but none are of any commercial importance.

**Octop'oda**, the eight-armed cuttlefishes. See CEPHALOPODA; OCTOPUS.

**Octopus**, a genus of the dibranchiate *Cephalopoda* (q.v.), or cuttlefishes, forming the type of the family *Octopodidae*, the members of which group are familiarly known as "poules." These forms possess eight arms of equal length, united to each other by a web varying in extent in different forms. The arms possess two rows of sessile, wholly fleshy suckers. The prominent head is joined to the body by a distinct "neck," and the body itself is short, generally more or less rounded in shape, and unprovided with side or lateral fins. The shell is internal, and is represented by two short "styles," which lie imbedded in the "mantle." In the octopods the third right arm of the male animals becomes developed to form a "hectocotylus" or sexual organ (see ARGONAUT); and in some this modified arm is detached from the body and deposited within the mantle cavity of the female for the purpose of fertilizing the eggs, a fresh arm being developed as occasion requires.

The poules attained a popular notoriety from the tales which were formerly circulated of gigantic members of this group which had no existence in reality. Some forms spread their limbs 12 or 14 feet, like great spiders, and might, under favorable circumstances, hold under water a person whom they had seized until he had drowned, at the same time biting him with their horny parrot-like jaws; no doubt such accidents have occasionally happened to pearl-divers and the like. Ordinarily, however, the octopus does not attain one half these dimensions, and many species, as that which yields "cuttlefish bone," have bodies no larger than an ordinary pear. These animals live in rocky places along shore and about reefs, protecting their soft bodies by sitting in holes and crevices with arms reaching out to seize their victims, which are fishes and any animal they are able to overpower. They are themselves preyed upon by large fishes, turtles, etc. Many species are eaten

## OCTOPUS — ODD FELLOW

in various parts of the world, and the common one (*Octopus vulgaris*), of the Mediterranean and neighboring Atlantic coasts, has been speared and taken to market from a time immemorial, and is still a regular object of pursuit, especially in Italy. A deep-water species (*Eledone moschata*) is trapped for market in from 10 to 20 fathoms of water by lowering earthen jars and leaving them a few hours. The creatures creep into these jars, as a fine hiding-place, and allow themselves to be drawn to the surface. The flesh is eaten boiled, fried, and in salads, and is preserved by pickling. Sepia (q.v.) is the substance in the "ink-bag"; and "cuttlebone" the supporting calcareous plate beneath the skin of certain species. Of the American species *O. bairdii* and others of the eastern coast dwell in deep water or about the tropical coral reefs. On the Pacific coast several species are taken near shore and were always utilized by the Indians. Since the settlement of California their flesh is regularly supplied to the San Francisco market, where it is bought by Italians and Chinese. Some specimens brought in there are among the largest known, measuring 14 feet across the outstretched arms. Consult books of conchology, especially Cooke, 'Mollusca' (1895); and 'Standard Natural History,' Vol. I. (1884). See ARGONAUT; CEPHALOPODA; CUTTLEFISH.

**Octopus, The**, a novel by Frank Norris, published in 1901. It was the intention of its author to write a trilogy of novels which should symbolize American life as a whole, with its hopes, aspirations, possibilities, and problems. This book, which is the first of the three, has for its central motive Wheat, the great source of American power and prosperity, and also the literal staff of life. 'The Pit,' the second of the proposed trilogy, appeared in 1902, not far from the time of the author's death.

**Octostyle**, a term in architecture applied to a temple or portico having eight columns in front. The most perfect example was the Parthenon at Athens, a building of the Doric order. Few remains of Greek buildings of this style exist, the common practice having been to construct temples of the hexastyle or six-column order. Another notable example of the octostyle is the portico of the Pantheon at Rome.

**Octroi, ôk-trwä', or Octroy**, an old French term particularly applied to the commercial privileges granted to a person or to a company. In a like sense the term is applied to the constitution of a state granted by a prince in contradistinction to those which are derived from a compact between the ruler and the representatives of the people.

**Ocu'ba-wax**, a vegetable wax obtained from the fruit of a nutmeg (*Myristica ocuba*), growing abundantly in the marshy grounds on the shores of the Amazon and its tributaries. It is easily bleached, and is used extensively in Brazil for the manufacture of candles.

**O'Curry, ô-kür'í, Eugene**, Irish scholar: b. Dunaha, County Clare, 1796; d. Dublin July 1862. He was son of a rather gifted farmer; though lame worked on the farm until 1834; was for three years employed on the Ordnance Survey; and after several years spent in copying Gaelic manuscripts and writing translations

became in 1855 professor of Irish history and archæology in the Catholic University of Ireland, then just founded. His lectures, published in 1860 as 'Manuscript Materials of Irish History,' are accounted the best single work on mediæval Irish literature. A second series of his lectures, 'The Manners and Customs of the Ancient Irish People,' appeared in 1873. O'Curry prepared the catalogue of the Irish manuscripts in the British Museum.

**Od or O'dic Force**, a force associated with magnetism, and alleged to explain the phenomena of mesmerism or animal magnetism and many other natural phenomena, supposed by Baron Reichenbach to have been discovered by him, and which is treated of at great length in his works. Od, according to him, pervades all nature, and is akin to the great physical forces of electricity, magnetism, chemical affinity, heat, light, etc., and always accompanies them, so that wherever they are in action od is developed, and the strength of its most active development is often in proportion to the energy of their action. In living animals, in effervescing and fermenting liquids, in putrefying substances, in magnets, and in galvanic batteries, od is briskly generated. It radiates from the generators, and its rays pass through all kinds of matter, at a speed of about 100 feet per minute, slower than light and more rapid than heat. As in electricity and magnetism there is a polar dualism, so also there is in od; it has two poles, the positive and negative, which keep company respectively with the electric and magnetic positive and negative poles. These odic poles appear in all organic substances. The human body is od-positive on the left side and od-negative on the right.

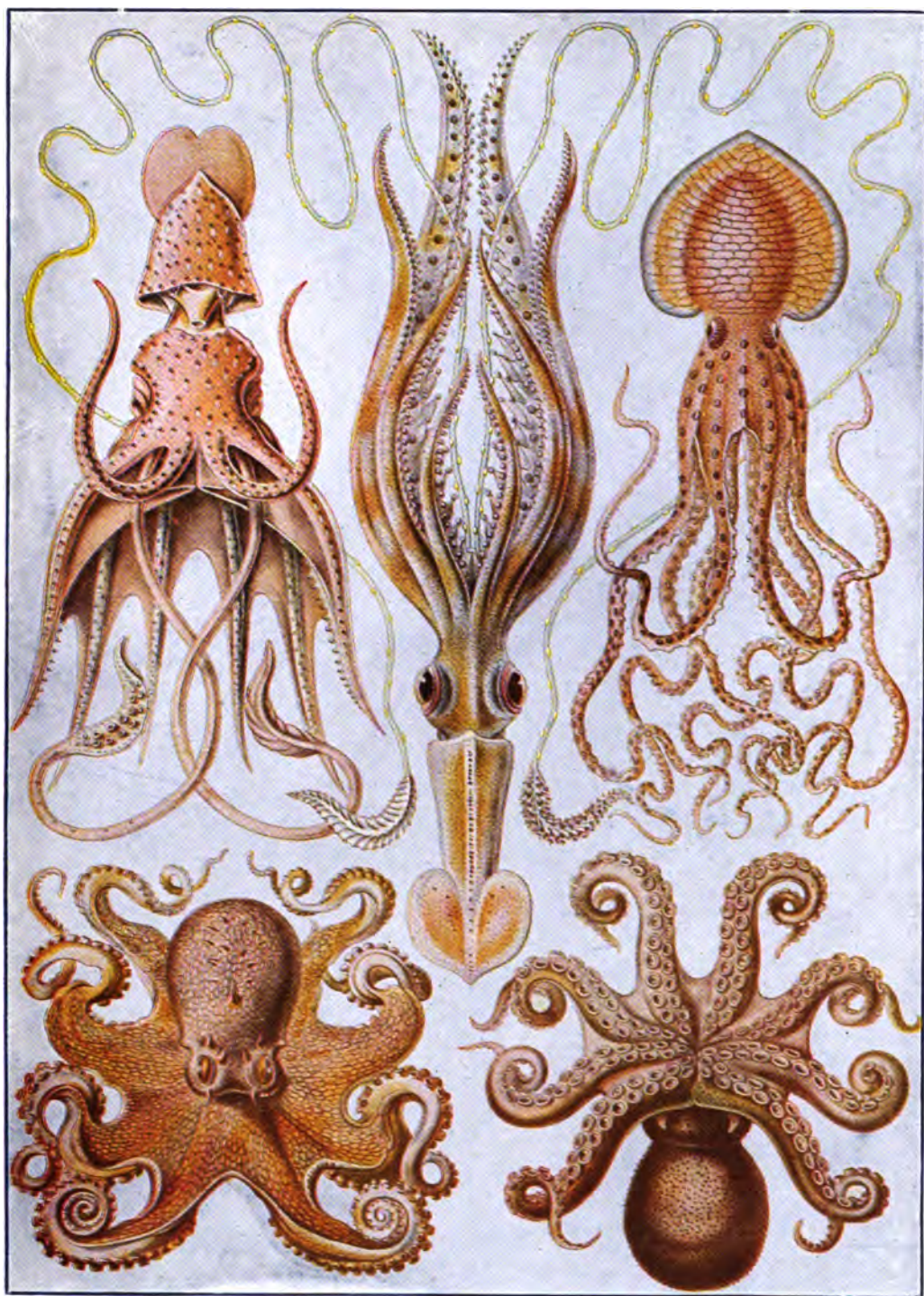
**O'dalisk, or Odalisque**, the Turkish name for a concubine in the Sultan's harem, of whom the Sultan has personal knowledge.

**Odd Fellow**, a person belonging to a society in the polity of which is combined both the fraternal and benefit features of benevolent orders. The legal title is "The Independent Order of Odd Fellows," and the general administration of its laws is designated by the generic term Odd Fellowship. The origin of the society and the source of its peculiar name cannot now be historically traced. Until nearly the close of the 19th century it had been asserted for years that Defoe,—the English novelist,—mentioned 'Odd Fellows' as early as 1745 A.D., but modern research has relegated this, as well as many other alleged incidents of the order's early days, to the realm of tradition. It is known, however, that a society grew up in England during the 18th century, almost rivaling in numbers and influence the Masonic Fraternity, and that this Antient and Most Noble Order of Bucks, began to decline about the year 1773, and passed out of existence. A reasonable supposition attains among antiquaries that these lodges furnished the nucleus of the Odd Fellows, into one lodge of which George IV. of England, while Prince of Wales, was quite unceremoniously admitted one night, and became a member thereof at a date subsequent to 1780. This is the first authentic reference to the society of Odd Fellows by name. The earliest ritual extant is dated in 1797, and was used by the Patriotic Order. It appears from English







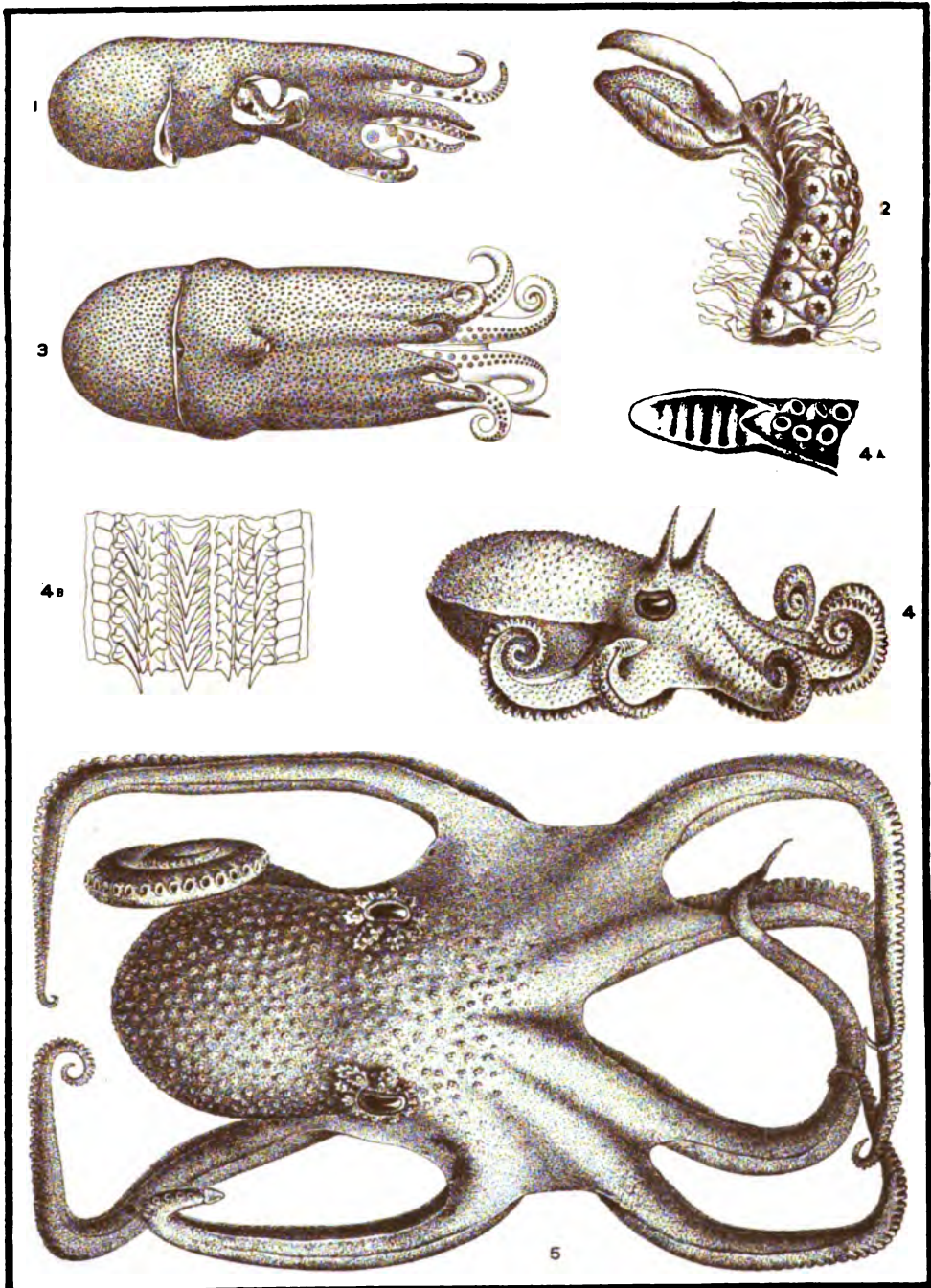


DECAPODS AND OCTOPODS





# AMERICAN OCTOPODS.



1. *Alloposus mollis*. Side view, showing the sac containing the hectocotylized arm, cut open so as to expose the partly developed arm.
2. Hectocotylized arm, enlarged.
3. Same animal, ventral view.

4. The common Octopus (*O. bairdi*) of the North Atlantic coast (male).
- 4a. Terminal part of sexual arm.
- 4b. Section of the lingual ribbon, showing flinty teeth.



## ODD FELLOW

contemporary history that an Improved Order existed prior to this, and the title, Most Noble Grand, for the presiding officer of the "Antient," as well as the subsequent Orders of Odd Fellows, would imply a common bond or succession. The Patriotic Order was followed by the Union, or United Orders, and the Loyal Order. In 1813 various lodges of the Union Order met and organized the Manchester Unity of Odd Fellows, now the principal Friendly society in Great Britain. In 1819 the American Order was founded, and was afterward affiliated with the Manchester Unity. This continued until 23 Sept. 1842, when the Odd Fellows of the United States resumed their original independence, reaffirming the resolution in 1843 and adopting a distinctively American ritual in 1845.

*Rise of the American Order.*—The first lodge established on this continent was Shakspeare, No. 1, New York city, 26 Dec. 1806. The five Odd Fellows composing this lodge were of the Loyal Independent Order, and the moving spirits were Solomon Chambers, and his son John C., English mechanics from the south of London. The early members were zealous workers and other lodges were soon organized. In 1809 the roll of membership, in the six New York city lodges, comprised 36 prominent citizens and business men, as well as many others of less influence. In 1819 George Pope Morris was admitted, and at once became a leader in the councils of the Order in the Empire State. Attempts had then been made to plant Odd Fellowship in other parts of North America. In 1815 there were two lodges in Halifax, Nova Scotia: Royal Wellington, No. 1, and Loyal Bon Accord, No. 2. Little is known of this pioneer effort in the British provinces, but the minutes of the Manchester Unity record a lodge chartered in Halifax about this date,—evidence presumptive of Unity origin. In Boston, during 1818, James B. Barnes,—who had emigrated to this country from England the previous year,—and four others instituted Massachusetts Lodge, No. 1, and held regular meetings, the method being, like New York, ancient usage and self-institution. The records extant, however, date only from 20 March 1820. Two Englishmen, a Jew, an Irishman, and a Frenchman comprised its charter membership. Washington Lodge, No. 1, of Baltimore, was organized 26 April 1819 under the leadership of Thomas Wildey, now recognized as the founder of American Odd Fellowship. Wildey came to the United States from England in 1818. He had been affiliated with one of the branches abroad since 1804—had "passed the chairs," and was known as a leading Odd Fellow. Whether he assisted in forming the Manchester Unity in 1813 is not of record, but his subsequent appeal to that body for regularity might indicate his knowledge thereof. The "Unity" became fully organized 21 Jan. 1814. Wildey began his search for Odd Fellows as early as 13 Feb. 1819, when he advertised in the *Baltimore American*; and, again, 27 March 1819, before the required "five for a quorum" had been obtained. The minutes state that the manner of institution was "ancient usage." This ceremony consisted of Wildey's obligation of himself in the presence of the others, and, in turn, the obligation of his companions. Subsequent events would indicate that the Manchester Unity ceremonies of 1816 were used by Wildey and his four associates: John

Welch, John Dunnean, John Cheatham, and Richard Rushworth. On 26 Dec. 1821 Pennsylvania Lodge, No. 1, Philadelphia, was formed, like those in New York, Boston, and Baltimore, on the self-institution principle, John Pearce being the leader, and his associates were, likewise, English mechanics. While the Order had been planted in four States, and the chief cities thereof according to ancient usage, an effort was soon made to frame constitutions, and to obtain charters from the so-called regular bodies of Odd Fellows in England. Meantime the pioneers exercised the functions of Grand Lodges,—instituting other lodges, and assuming sovereignty over them. The Order in Baltimore secured a charter, under date of 1 Feb. 1820, from the Duke of York Lodge, Preston; and this charter not only recognized the regularity of Washington, No. 1, and its associate lodges, but created the Grand Lodge of Maryland and of the United States of America, of the Independent Order of Odd Fellowship. In Brooklyn, Columbia Lodge, No. 1, obtained a charter from Loyal Beneficent Duke of Sussex Lodge of Independent Odd Fellows, Liverpool. This document was delayed in transmission, and did not reach its destination until late in January 1823, although dated 4 Nov. 1822. Meantime Columbia Lodge had removed to New York. It at once assumed sovereign jurisdiction, and this led to contention; and the attempt of Morris and others to establish a supreme government with headquarters in New York. At this juncture Pennsylvania applied to the Order in New York and Maryland for recognition. It is recorded that the evidence of regularity received from New York city was more satisfactory to the Odd Fellows of Philadelphia than that of Baltimore; and it is also stated the lodges in Boston, New York, and Baltimore were not aware of one another's existence before this event. The Order made history rapidly during the succeeding six months. Each locality was dominated by a master mind: Wildey, in Maryland; Morris, in New York; Barnes, in Massachusetts; Pearce, in Pennsylvania. The question of supremacy, however, was soon settled. Massachusetts readily surrendered its claims to priority, and accepted a charter from the Grand Lodge of Maryland and the United States, on 9 June 1823; and the Grand Lodge of that commonwealth was duly opened 11 June 1823,—all the lodges participating. Morris was overthrown as Grand Master, in New York, by the dissensions mentioned above, and was lost to Odd Fellowship. The Order in that State accepted a like charter, dated 4 June 1823, and the Grand Lodge was duly instituted 24 June 1823. It having become known that Wildey had endeavored to unite the Odd Fellows of Massachusetts and New York, overtures were also made to Pennsylvania, and these were immediately accepted. The charter is dated 13 June 1823, and the Grand Lodge of the Keystone State was organized 27 June 1823. The consolidated Order became at once homogeneous and prosperous. As a prelude to these momentous events, coincident with the actual foundation of the American Order, the managers in Maryland had organized, under the Duke of York Lodge charter, the Grand Lodge of Maryland, and of the United States, 22 Feb. 1821, which relegated Washington and others, in Maryland, to the condition of subordinate



lodges. Following the centralization of the government of the four pioneer commonwealths, the "Grand Lodge of the United States" was evolved, on 15 Jan. 1825, by the representatives of the Grand Lodges of Massachusetts, New York, Pennsylvania, and Maryland,—the last-named taking her place with the State Grand bodies, subordinate to the sovereign head. This theory of a government composed of one head,—the source and repository of all true Odd Fellowship,—with subordinate State bodies, and lodges subordinate, in contradistinction to the English system of a governing movable committee, was due to the genius of John Pawson Entwistle,—a scholarly gentleman,—who had joined the Order in 1820, becoming the *brains* of the young organization; while Wildey and his compeers, unlettered men, may be likened to the *body* of the vigorous institution. Entwistle was the first Deputy Grand Master, and was afterward Grand Secretary, but his career as a "builder" was cut short by his early decease. The last link in the chain of regularity was forged 15 May 1826, when the American body was chartered by the Manchester Unity. Significant of this, the early charters were issued to the Order of Independent Odd Fellows, and the branches originating in the United States were organized irrespective of the consent of the English body even prior to 1842-3, the date of official separation.

*Government and Degrees.*—Between 1826 and 1885 the government of the Order had been evolutionary in its nature. The inheritance from England in ritualistic matters was the merest outline of a possible utility. The degrees were crude in structure, and unsuited to the genius of a modern fraternal society, being copies from orders of other origin,—notably from Masonry. When the foundations of government had become settled, attention began to be paid to degrees of higher significance than the lodge system. Entwistle gave the first impulse to this part of the fabric of Odd Fellowship. After his death the work was continued by a long line of distinguished Odd Fellows, including such American citizens as James L. Ridgely, Grand Secretary from 1838 to 1881; James B. Nicholson, Isaac McKendree Veitch, Schuyler Colfax, who may be said to have been the "builders" of the Order; Rev. Edwin H. Chapin, D.D., Rev. James D. McCabe, D.D., Tal. P. Shaffner, who, together with Entwistle and Ridgely, were largely the authors of the present American ritual. Two English degrees and one American, finally, made up the encampment series. As early as 1821-5 these were conferred in connection with the lodge department. The final separation of the encampments into a distinct branch, higher than the lodge, and governed by Grand Encampments, did not occur until 1841. In 1851-2 the Rebekah degree was adopted, its author being Schuyler Colfax. This is a branch to which both sexes are admitted. The sequence of degrees was completed in 1885 by the adoption of the Patriarchs Militant, and organization of the uniform or display branch. The Grand bodies followed the sequences of the degrees. In 1879 the name of the supreme body was changed to the Sovereign Grand Lodge, a title more in consonance with its inherent powers, especially in its jurisdiction without the United States of America. The Sovereign Grand Lodge is made up of

Grand Representatives from the Grand Lodges and Grand Encampments of the United States and Canada. Grand Lodges possess jurisdiction over State and Provincial Rebekah Assemblies, and Rebekah lodges, as well as in the government of subordinate lodges. The Patriarchs Militant, with the local unit, called Canton, is organized like the United States Army, with Department Councils,—all under the immediate government of the Sovereign Grand Lodge. In Australasia, Denmark, Germany, the Netherlands, Sweden, and Switzerland, Quasi-Independent Grand Lodges govern the Order. These hold an allegiance to the Sovereign Grand Lodge, use the American ritual modified, and a common bond exists in connection therewith; but they do not enjoy a representation in the sovereign head. They, however, govern the Order in the countries named, and conform to the laws and usages of the civil governments thereof. The development of this dual system was the labor of many years and varied experiments. The dates of the introduction of American Odd Fellowship without the United States were these: Canada, 1843; Australasia, 1868; Denmark, 1878; Germany, 1870; the Netherlands, 1877; Sweden, 1884; Switzerland, 1871. As early as 1846 lodges were instituted in the Hawaiian Islands; in Cuba, in 1883; in Mexico, in 1882; and the Order has followed the flag into the Orient, having been established,—including South America,—in 22 nationalities, provinces, and territories,—in 18 of which Grand Lodges have been chartered. In 1902, however, of the entire lodge membership of 1,068,732 only 37,333 were enrolled outside of North America.

*Other Organisations of Odd Fellows.*—The largest body is the Manchester Unity, numbering 950,000 members. It has lodges throughout Great Britain and its colonies,—a few in the United States,—and is, in effect, a chartered benefit society. Annual reports are made to the government, under the laws regulating Friendly societies, and actuaries determine the solvency or insolvency of the Order, and license lodges accordingly. In ritual matters, likewise, it has nothing in common with American Odd Fellowship. The Grand United Order ranks next in relative importance. This body is the parent of the colored lodges in the United States and elsewhere, and is of English origin. Other Friendly societies exist in Great Britain, and are of more or less importance as health insurance associations.

*Beneficent Features.*—The American Order has not incorporated into its polity any features of health or life insurance; indeed, it has, on the contrary, refused to recognize voluntary associations of Odd Fellows, the object of which was to enlarge the benefit systems of regular relief. Nevertheless, the Order has always insisted upon "stated weekly and funeral benefits," distinct from voluntary *charity*,—these payments to members who are ill, or in affliction, being of "right," not a donation. This characteristic is a distinguishing trait of the American Odd Fellow. On the great seal is emblazoned: "We command you to visit the sick, relieve the distressed, bury the dead, and educate the orphan." Correlatively the attention of the Order was early attracted to the founding of institutions of learning, several of which have survived. The dual motive of fra-

ODD FELLOWS.



THOMAS WILDEY, FOUNDER OF THE ORDER.



ternity and stated relief led to the establishment of homes for the aged, the indigent, the widow, and the orphan. Pennsylvania has 6 of these homes, New York has 4, Illinois 2, California 2, and several other States possess two, with more in prospect. Every Grand Lodge in the United States and Canada has one or more of these homes, or has taken measures to found such an institution. This beneficence has been fostered in foreign jurisdictions as well; and the Order in Denmark has purchased the palace of the Crown Prince for this purpose, going into the "home idea" on a scale that eclipses all previous efforts. Other nationalities are in no wise behind their fellows in this beneficence.

*The Reunion of 1865.*—During the Civil War of 1861–5 the roll of the Southern jurisdictions was regularly called during the annual sessions of the Sovereign Grand Lodge. At the close of hostilities, the officers and members in the South were welcomed to the chairs and seats which had been held for them during the four years of strife and separation. The roll-call at Baltimore, 18 Sept. 1865, by the venerable Grand Secretary Ridgely, was notable even in fraternal circles. Every survivor answered to his name, and appointments had been made to fill vacancies so that the representation was complete. Attempts had been made throughout the States composing the Southern Confederacy,—with varying success,—to keep up the organizations of the Order; but, at this reunion, measures were unanimously adopted whereby fraternal hands and hearts assisted in rebuilding the waste places. This was the first fraternization of the Blue and the Gray. The procession in the streets of Baltimore the next day,—occupying more than one hour in passing any given point,—attracted national attention. The marshals were: Joseph Kidder of New Hampshire, and John Q. A. Herring of Maryland.

*Statistics.*—In 1903 the relative strength of the Order was reported as follows:

Sovereign Grand lodge .....	1
Quasi-Independent Grand lodges .....	2
Grand lodges .....	67
Grand encampments .....	55
Subordinate lodges .....	13,277
Subordinate encampments .....	2,862
Rebekah Lodges .....	6,027
Persons enrolled .....	1,329,956
Annual relief .....	\$ 4,068,510.96
Relief from 1830 .....	96,468,525.32
Invested funds .....	34,386,495.74

*Bibliography.*—'Ars Quatuor Coronatorum,' London; publications of Early English Text Society; 'History of Signboards,' London; Ridgely and Spry, histories of Odd Fellowship; 'Official History of Odd Fellowship, the Three-Link Fraternity' (Boston); Rituals of 1797, 1816, 1845, and 1880; Proceedings, G. L. U. S. and S. G. L. (Vols. I. to XX.).

H. L. STILLSON,  
Official Historian.

*Ode*, a lyric poem, supposed to express the feelings of the poet in the pressure of high excitement, and taking an irregular form from the emotional fervency which seeks spontaneous rhythm for its varied utterance. The Greeks called every lyrical poem adapted to singing—and hence opposed to the elegiac poem—an ode (*ōdē*, that is, song). The principal ancient writers who employed this form of verse were Pindar, Anacreon, Sappho, Alcæus, among the Greeks, and Horace among the Romans. As em-

ployed by English writers the ode takes either the Pindaric form of strophe, antistrophe, and epode irregularly arranged and contrasted; or, as in its later development, the form of a regular series of regular stanzas. The former style is found in Dryden's 'Ode for Saint Cecilia's Day,' while the latter is seen in Shelley's 'Ode to a Skylark.' The masters of English poesy who have carried the ode to its highest achievements are Milton, Dryden, Collins, Gray, Coleridge, Wordsworth, Keats, and Shelley.

**Odell**, ō-dēl', Benjamin B., Jr., American political leader: b. Newburgh, N. Y., 14 Jan. 1854. He was educated at Bethany College, W. Va., and at Columbia, leaving the latter after three years to enter the ice business with his father in Newburgh. He proved successful in business, acquired an interest in his father's establishment, and also became president of the Consolidated Gas, Electric Light, Heat and Power Company of Newburgh and treasurer of the Central Hudson Steamboat Company. He early took an interest in politics and soon became a prominent local leader of the Republican party; in 1880 he was a candidate for State senator, but was defeated. In 1894 he was elected to Congress from a district which had formerly been controlled by the Democrats; in 1896 he was re-elected, and declined the nomination in 1898; during his last term in Congress he was chairman of the committee on accounts and a member of the committee on the District of Columbia. Before his first election to Congress he had been chosen chairman of the executive committee of the Republican State Committee, and in 1898 was made chairman of the State Committee; the election of Roosevelt as governor was in large measure due to the energy and skill with which he conducted the campaign. In 1900 he was unanimously nominated for governor by the Republican party, conducted his own campaign, and was elected by a plurality of over 111,000. At the time of his election he was but little known to the people at large, but from the first of his administration gained a reputation which has become national, through his policy of the reduction of direct taxes and strict business-like administration of public funds, as well as for his growing power as leader in his own party. Under his leadership laws were passed which increased indirect taxes and reduced the direct tax to .13 of a mill, and at the same time appropriations for roads and schools were increased; the administration of State insane asylums was also simplified by abolishing the board of managers and centralizing control under the Commission on Lunacy. In 1902 Governor Odell was unanimously re-nominated and was re-elected. In the first year of his second administration a referendum vote of the people authorized enlargement of the Erie Canal which he had consistently urged. He has opposed special legislation and has vetoed a large number of special and personal bills, has favored home rule for cities, and given valuable aid to tenement house reform. In 1903 Columbia University conferred upon him the honorary degree of LL.D. in recognition of his public services.

**Odell**, Jonathan, American clergyman and Tory satirist: b. Newark 26 Sept. 1737; d. Fredericton, N. B., 25 Nov. 1818. A grandson of Jonathan Dickinson (q.v.), he was educated

at what is now Princeton University, studied medicine, was surgeon in the British army, and, after several years spent in England, where he was ordained a deacon of the Church of England and in 1767 became a priest, was made rector of Saint Ann's, Burlington, N. J. He assured the colonial authorities that he would keep his loyalist sentiments to himself in the exciting times before the Revolution, but on 4 June 1776 wrote his famous birthday ode for the King, which may have suggested in part the phraseology of 'Hail, Columbia,' as it begins 'O'er Britannia's happy land.' The New Jersey Convention holding him an enemy to the American cause, exacted from him a parole to keep on the east side of the Delaware and within eight miles of Burlington. He was driven from home by the patriot forces, took refuge in the home of Margaret Morris, who hid him in a secret chamber, and escaped to New York, where he took a prominent part among the Loyalists, notably by his acrid and venomous satiric attacks on Congress and its individual members, as in 'The Word of Congress' (1779), 'The Congratulation,' 'The Feu de Joie,' and 'The American Times' (1780). Upon the evacuation of New York he lay in England for a time and then removed to New Brunswick, where he, his son, and his grandson after him held high office and took much interest in politics. Consult the chapter on Odell in Tyler, 'Literary History of the American Revolution.'

**Ödenburg**, ö'dën-boorg (Hungarian *Sopron*), Hungary, the capital of a county of the same name, near the southwest shore of the Neusiedler See, 36 miles southeast of Vienna. It dates from the Roman *Scarabantia* and has several interesting ecclesiastical and other edifices. Its industries comprise woolen, linen, and cotton cloth, sugar refining, cutlery, glass, and earthenware; and it has a trade in these, and in corn, cattle, wool, wine, etc.

**Odenheimer**, ö'dën-hi-mër, William Henry, American Protestant Episcopal bishop; b. Philadelphia 11 Aug. 1817; d. Burlington, N. J., 14 Aug. 1879. He was graduated from the University of Pennsylvania in 1835 and after taking orders in the Episcopal Church in 1841 was rector of St. Peter's Church, Philadelphia, till 1859. In the year last named he was consecrated third bishop of New Jersey. On the division of the diocese in 1874 he chose the diocese of northern New Jersey (now Newark). He was prominent as a hymnologist, and among his published works are: 'Origin and Compilation of the Prayer Book'; 'The Devout Churchman's Companion'; 'Private Prayer Book.'

**Odense**, ö'dën-së, Denmark, a seaport town, capital of the Island of Fünen, on the Offense Aa, near the fiord of same name. It is well built, and has an ancient and magnificent cathedral, in which several of the Danish kings are buried, a royal palace, an old state house, and a richly endowed hospital. The principal manufactures are cloth and iron castings; and the trade, much facilitated by water communication, is considerable.

**Odenwald**, ö'dën-vält, Germany, a forest and chain of mountains between the Neckar and the Main, in the territories of Hesse-Darmstadt, Baden, and Bavaria. The Neckar divides the Odenwald from the Black Forest. The Oden-

wald is about 50 miles in length, contains 1,740 square miles, and in Katzenbuckel attains a maximum altitude of 2,057 feet. It presents charming scenery and in literature is associated with much interesting tradition.

**Ode'on**, among the Greeks and Romans, the name applied to a public building devoted to poetical and musical contests. The first odeon was built at Athens by Pericles, and was afterward used for popular meetings and the holding of courts. At a later period two others were erected in Athens, beside those in other Greek cities. The first odeon at Rome was built in the time of the emperors. The odeons resembled the theatres, except that they were inferior in extent and were covered with a roof. The name is occasionally given in the United States to a music hall or theatre, as is also *orpheum*.

**Oder**, ö'dër, a river of Germany, which rises in Moravia, in the southern branch of the Sudetic Mountains, flows through Silesia, becomes navigable for small boats at Ratibor, passes by Breslau, where it is navigable for barges of 40 to 50 tons, enters Brandenburg and Pomerania, and empties into the Baltic. Its whole course is above 500 miles; it receives numerous navigable streams, communicates with the Elbe by several canals, and is of great commercial importance. The principal towns on its banks are Breslau, Frankfort, and Stettin. Before reaching the sea it forms the large maritime lake called the Stettin Haff, and divides into three branches—the Peene, Swine, and Dvina.

**Odesa**, ö-dës'a, Russia, a town and seaport in the government of Kherson, on the Black Sea, between the mouths of the Dniester and Dnieper, about 950 miles south of Saint Petersburg, ranking as the fourth city of the empire. It is built principally of stone, and is thoroughly modern in appearance. Among the promenades and squares of the city are: the Nikolai Boulevard, beside the harbor, with a bronze statue of the Duc de Richelieu; the Cathedral Square, with the monument of Prince Voronzoff; the Catharine Square, with a monument of the Empress Catharine II.; the Alexander Park, with a pillar in honor of the Emperor Alexander II. Among the Greek churches are the Cathedral or Sobornaja church, built in 1794-1848. The other buildings and institutions of the city comprise: the town-hall; the Voronzoff palace; the archiepiscopal palace; the public library; the chief passenger railway station; the university; the large and splendid town theatre; the post-office; the custom-house; the institution for noble ladies; the barracks, etc. The university, founded in 1864 as a development of the Richelieu gymnasium, has a large library, museums, an observatory, etc. There are numerous other educational institutions of different kinds and grades, including several technical schools. There are also hospitals, an orphanage, a founding institution, and a bacteriological institute. Tramways and omnibuses facilitate internal communication; the town is well supplied with water from the Dniester, and is electrically lighted. The harbor, which is protected on the southeast by a long mole with a lighthouse at the end, and by a breakwater, consists of several sections separated by shorter moles, and has a floating

dock. The port is usually icebound for a few days in winter, but an ice-breaker is now in use to keep it open. Strong batteries protect the harbor basins from seaward attacks. Odessa is the chief grain exporting seaport of Russia. Other articles of export are sugar, timber, flour, oil-seeds and oil-cake, beans, peas, and fish. The principal imports are coal, tea, fruits, agricultural implements and machinery, iron and steel, and raw cotton. The chief industrial establishments are the sugar refineries, flour-mills, oil-mills, engineering works, tanneries, tobacco factories, soap works, jute works, breweries, etc. Odessa, named after Odessus, an ancient Greek settlement on this site, dates practically from the Turkish castle of Khadjibey, built in the 15th century and captured by the Russians in 1789. Odessa was bombarded during the Crimean war. Pop. (1897) 405,041.

**Ode'um.** See ODEON.

**Od'gers, William Blake,** English barrister: b. Plymouth, Devonshire, 15 May 1849. He was the son of a Unitarian minister, W. J. Odgers, and was educated at Cambridge University. He became a barrister of the Inner Temple in 1873, was recorder of Winchester 1897-1900, and of Plymouth from the last-named date. He has published 'King Arthur and the Arthurian Romances' (1872); and such well-known legal works as 'Odgers on Libel and Slander' (1881); 'Odgers on Pleading Practice and Procedure' (1891); 'Outlines of the Law of Libel' (1897); 'Odgers on Local Government' (1899).

**O'din,** Teutonic god, called WODAN by the Saxons and Wuotan by the High German. He held a high place among the "ases" or secondary gods of the Scandinavian mythology at first, and later came to be held the centre of the system, the ruler of the world, the patron and source of all sciences, inventor of runic writing, of poetry, and of magic (hence identified with Mercury Hermes by the Roman writers on Germanic customs and religions), and, Minerva-like, a protector and companion of all brave heroes. Probably in origin he was a storm-god; his name seems to mean "the mad, or raging one" (see WYOTAN and modern German *wüten*); and in this aspect he is portrayed as riding the eight-footed horse Sleipnir. As a wind-god his functions were various: he presided over the harvest and over the sailing of ships, and was god of battles and of the dead. In battle he was accompanied by the Valkyries, who brought to Odin's banqueting hall, Valhalla, the slain heroes. Sometimes, Apollo-like, he is the sun-god, the sun is his eye, the heaven his canopy, and the mountain of Hlidskjalk his throne, at the sides of which are his raven messengers, Hugin ("Thought" or "Reflection") and Munim ("Memory"), who bring him news of all that happens in the world, and the two wolves, Gere and Freke. Odin's wives were three: Iord (the inhabited earth), Frigg (the cultivated earth), and Ring (the winter-locked earth). Snorre Sturleson and Saxo Grammaticus make Odin a chief, who in alliance with Mithridates fought the Romans unsuccessfully. To the Roman identification of Odin with Mercury is due the use of his name for the fourth day of the week (French "Mercredi," German "Dienstag," English "Wednesday," that is, Odin's or Wodan's day).

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**Odoacer,** ð-dō-ā'sér, king of Italy: d. 5 March 493. The son of Edecon or Ædicon, who may be identical with one of Attila's lieutenants, and a Scyrian or Rugian by birth, he became a leader of a band of Rugians, Herulians, Scyrians, and Turrilingians, entered the Roman army about 470, and in 476 was a member of the imperial bodyguard. When Orestes deposed Nepos and made his own son, Romulus Augustulus, emperor, Odoacer headed the rising of the dissatisfied German soldiers, killed Orestes, forced Romulus to retire, received the title of *patricius* from the Eastern emperor Zeno, but no recognition as king of Italy, yet in spite of this played the part of king ably for a time. He conquered Dalmatia in 482 and defeated the Rugians in 487 and 488. But in 489 Theodoric, king of the Ostrogoths, was sent against him by Zeno, and after repeated defeats forced him to surrender, promising him a share in the rule of Italy. The defeated king was assassinated at a banquet a week after his surrender. Consult Hodgkin, 'Italy and her Invaders,' Vol. III. (1885).

**Odom'eter,** a small clock-like mechanism employed for registering the number of revolutions of a carriage, automobile, bicycle, or other wheel, to which it is attached. The workings of the odometer are very simple: Two wheels of the same diameter, and turning freely on the same axis, are placed face to face; the edge of one is cut into 100 teeth, and that of the other into 99 teeth, and an endless screw works into the notches in each wheel. When the screw has turned 100 times around, the wheel having 99 teeth will have gained one notch on the other, which gain is shown by an index attached to one wheel, which passes over a graduated arc on the other. Every 100 turns are thus registered on the second wheel, and all turns less than 100 are shown by a separate index. Now, instead of the screw turning on its axis, it is found more convenient to have the screw fast, and to allow the weight of the machine to be suspended freely, so that as the carriage wheel turns, the effect is the same as turning the screw on its axis.

**Odonā'ta.** See DRAGON FLY.

**O'Donnell,** ð-don'el, **Leopold, DUKE OF TETUAN,** Spanish marshal: b. Santa Cruz, Teneriffe, Spain, 12 Jan. 1809; d. Bayonne, France, 5 Nov. 1867. He entered the Spanish army and supported Maria Christina, the queen-mother, in her struggles against the Carlists, and by intrigue he secured the appointment of governor-general of Cuba in 1843. In 1854 he was war minister under Espartero and in 1856 and 1858 was prime-minister. He was recalled in 1863 and again in 1865-6, but never held the confidence of the country.

**O'Donoghue,** ð-dón'ô-hû, **David J.,** British biographer and editor: b. London, England, 22 July 1866. He was educated in Roman Catholic schools and entered journalism in which field he has written principally on Irish art, music, and literature for leading Dublin newspapers. He founded the Irish Literary Society in London and is vice-president of the National Literary Society in Dublin. He has published: 'The Poets of Ireland' (1891-3); 'Traits and Stories of the Irish Peasantry' (4 vols. 1896-7);



'Life of William Carleton' (2 vols. 1898); 'Life of Robert Emmet' (1902); etc.

**O'Donoju, Juan**, hoo-än' ð-dön-ð-hoo', Spanish soldier: b. Spain about 1755; d. Mexico 8 Oct. 1821. He entered the Spanish army where he attained the rank of lieutenant-general and was in 1821 appointed captain-general and acting viceroy of New Spain. Upon his arrival at Vera Cruz he found the country in the hands of the revolutionists and his authority only nominal. He accordingly resolved to treat with the insurgents and on 23 Aug. 1821 he signed with Iturbide at Córdoba a treaty which recognized Mexico as an independent state over which a Bourbon prince was to reign. The country remained in the hands of the revolutionists and O'Donoju died before the nullification of his treaty by the Spanish Cortes.

**O'Donovan, ð-dön'ð-van, John**, Irish scholar: b. Attamore, County Kilkenny, Ireland, 9 July 1809; d. Dublin 9 Dec. 1861. He was educated in Dublin, entered the Irish Record office in 1826 and was appointed in 1829 to the historical department of the Irish survey. He was connected with the Irish Archaeological Society from its foundation in 1840, in 1847 was called to the Irish bar, and from 1852 was in the employment of the commission for the publication of the ancient laws of Ireland. Of the many editions of Irish works issued by him, the greatest is that of 'The Annals of the Four Masters' (1848-51). He also wrote an authoritative 'Grammar of the Irish Language' (1845).

**O'Donovan, William Rudolf**, American sculptor: b. Preston County, Va., 28 March 1844. He served in the Confederate army in the Civil War and at its close opened a studio in New York. His work, though his art is self-taught, soon gained a reputation and in 1878 he became an associate of the National Academy. He executed the statue of Paulding at Tarrytown, the statues of Washington for Caracas, Venezuela, Newburgh, N. Y., and for the Trenton battle monument. The equestrian statues of Lincoln and Grant for the Soldiers and Sailors' arch in Prospect Park, Brooklyn, are his work, likewise also the memorial tablet to Bayard Taylor at Cornell University, etc.

**Odontoglossum**, an extensive genus of orchids, natives of Central America, much prized by cultivators for their magnificent flowers, which are remarkable both for their size and the beauty of their colors. A considerable number of species have been introduced into Europe, and grow well in a moderate temperature. *O. crispum* or *O. Alexandræ* is a superb flower, and was named after Queen Alexandra when Princess of Wales. See ORCHID.

**Odontornithes**, a sub-class of birds, extinct and known only from remains in the Cretaceous rocks, which had the jaws furnished with true teeth and the wings well developed in some, in others rudimentary. It contains two orders, *Odontolceæ*, comprising the *Ichthyornis* (q.v.) and its allies, whose teeth were set in continuous grooves; and *Odontormææ*, such as *Hesperornis* (q.v.) and its allies, in which each tooth was set in a separate socket. Consult: Marsh, 'Odontornithes' (1880); Evans, 'Birds' (1900).

**Odysseus**, ð-dīs'ūs. See ULYSSES.

**Odyssey**, ðd'ī-sī, **The**, an epic poem attributed to Homer, in which the adventures of Odysseus (Ulysses) are celebrated. See HOMER.

**Œcolampadius**, ěk'ō-lām-pā'dī-ūs ('Light-of-the-House'). Græcized name of Johannes Hüssgen, German religious reformer: b. Weinsberg, Würtemberg, 1482; d. Basel 24 Nov. 1531. He began by studying law in Bologna, and after a further course in philosophy, history, and the classical tongues in Heidelberg, Tübingen, and Stuttgart, he returned to Weinsberg. He was appointed preacher at Basel in 1515 and assisted Erasmus in producing his edition of the New Testament. After two years' residence at Augsburg (1518-20) he entered the monastery of Saint Bridget at Altenmünster, near Augsburg. Coming upon Luther's writings he left the monastery, and joining the reform movement, eventually went to Basel (1522) where he was appointed professor of theology and occasional preacher in Saint Martin's Church. He vigorously pushed forward the Reformation by his disputations, addresses, and writings; especially by his controversial activity at Baden in 1526, and at Bern in 1528; he did the same service at Basel, where as rector of the Cathedral he occupied the leading ecclesiastical position. He was in 1531 called to Ulm and worked there with Bucer and Blarer in the cause of ecclesiastical reformation. He entered upon a stubborn controversy with Luther on the subject of the Lord's Supper, and espoused the view of Zwingli in his 'De Genuina Verborum Domini, Hoc est Corpus Meum, Interpretatione.' In 1529 he held a public disputation with Luther on the same subject at Marburg. He was one of the kindest-hearted and most liberal-minded of the reformers. Weak in health from his early days he overtasked his strength, and by his premature death, was in some degree a martyr to his own zealous activity. He was buried in the cloister of the Cathedral at Basel. Consult: Herzog, 'Leben von Johannes Hüssgen' (1843); Hagenbach, 'Leben von Johannes Hüssgen, mit ausgewählten Schriften' (1859).

**Œcumenical**, ěk-ū-mēn'ī-kal (Greek, *oikoumenikos*, of, or pertaining to, the whole inhabited or civilized world, generally the Mediterranean basin, universal). This epithet is generally applied to the general councils of the church, or councils to which all the bishops throughout the world were invited. According to the theologians of the English Church there have been only six Œcumenical councils; namely, that of Nicæa, 325 A.D.; Constantinople, 381 A.D.; Ephesus, 431 A.D.; Chalcedon, 451 A.D.; Second of Constantinople, 553 A.D.; and Third of Constantinople, 680 A.D. In the Roman Catholic Church it is applied to those councils whose members are convoked from the whole world under the presidency of the pope or his legates, and whose decrees, confirmed by the pope, bind all Christians. In the case of the first Œcumenical council, that of Nicæa or Nice, the Emperor Constantine summoned the bishops and Hosius presided as Pope Sylvester's legate. Toward the end of the 6th century the patriarchs of Constantinople assumed the title 'Œcumenical' in the same sense as the epithet Catholic in the Western Church, but the Roman See always refused to sanction it. See COUNCIL, and NICÆA, COUNCIL OF.

**Œde'ma**. See DROPSY.

**Ædenburg**, é'dën-boorg, Hungary. See **ÖDENBURG**.

**Ædipus**, ɛd'ī-pūs, the principal character in three tragedies of the Greek dramatist Sophocles. He was the son of Laius, king of Thebes, and his wife Jocasta. As Laius had been warned before the child's birth that he was to die by the hands of his son, he ordered the infant to be exposed on Mount Cithæron, his feet having first been attached together by a transfixing pin. The effect of this cruelty was that he was afterward known as "the man with swollen feet" (**Ædipus**). The herdsman to whom the task of exposing the child was committed compassionately gave him to the shepherd of Polybus, king of Corinth, who was childless, and **Ædipus** became that monarch's adopted son. The young man, who considered himself a prince of the Corinthian royal house was once taunted with his origin by a drunken companion; his suspicions were roused, and he fled from Corinth. The oracle at Delphi in answer to his inquiries as to his birth would only tell him that he was fated to slay his father and marry his mother. Leaving the oracle he pursued his journey and met Laius and his servants. The king of Thebes in his chariot tried to force **Ædipus** from the road and was slain by the young man, who slew all the attendants also, as he supposed. In course of time he reached Thebes, where Creon, brother of Laius, had succeeded to the throne, and was offering the hand of the widowed Jocasta as well as the kingdom to the man who should release the city from the sphynx, a monster which devoured every one failing to find an answer to her as yet insoluble riddle. **Ædipus** answered the riddle and slew the sphynx. He had many years of prosperity as King of Thebes and husband of Jocasta, but eventually a pestilence visited the land which, according to the Delphic oracle, could only be checked by expelling from the country the assassin of Laius. When at last it was brought home to **Ædipus** that he was the man he put out his eyes and Jocasta hanged herself. Then **Ædipus** went forth a wanderer led by the hand of his daughter Antigone, the Cordelia of the Greek stage, until he reached Athens, entered the grove of the Eumenides and there was called without death or pain, into the other world.

**Ædipus Coloneus**, kō-lō-nē'ūs, "Ædipus at Colonus," Greek tragedy by Sophocles, first presented at Athens after his death by his son Sophocles in 401. (See **ÆDIPUS**.) The play has pathos and beauty, but little dramatic power. Legend says that Sophocles by reading aloud the finest passages in it proved his sanity when brought before judges by his children, who were eager to administer his property.

**Ædipus Tyrannus**, ti-răn'ūs, "Ædipus the King," a tragedy by Sophocles (q.v.), played first at Athens about 415 B.C. (See **ÆDIPUS**.) The same theme was treated in Latin by Seneca, in English by Dryden, and in French by Corneille, Voltaire, Chénier, and Lacroix.

**Oehlenschläger**, ɛ'l'en-shlä-gër, or **Oehlenschläger**, Adam Gottlob, Danish poet: b. Vesterbro, near Copenhagen, 14 Nov. 1779; d. Copenhagen 20 Jan. 1850. He was son of the organist of the Danish royal palace at Fredericksburg; began to write poetry at 9; attracted the attention of Storm, who assisted in

the boy's education; made unsuccessful ventures in commercial life and as a comic actor; and under the patronage of the Oersted brothers (qq.v.) again devoted himself to study and to literature. Strongly imbued with the spirit of the Old Norse sagas and with modern German romanticism, his first published poems, 'Digte' (1803); 'Tors Reise til Jotunheim'; 'Vaulundurs Saga,' and 'Aladdin, eller den forunderlige Lampe,' gained him a national reputation at 26 and won from the government a pension for foreign travel. In Halle, where he lived with Steffens, he wrote the great historical tragedy, 'Hakon Jarl'; and upon his return to Denmark was elected professor of æsthetics in the University of Copenhagen (1810). His best work was done by 1830, the later volumes being far below the average. Oehlenschläger is the great national poet of Denmark, a leader of the romantic movement, who did much for renewed interest in early Teutonic and Norse literature and legend, and who was spiritually akin with the English romanticists of the first half of the 19th century. Oehlenschläger's 'Aladdin' is accessible to the English reader in the excellent version by Sir Theodore Martin (1863). His other important works include: 'Correggio,' a tragedy written in German (1809)—it is to be noted that Oehlenschläger himself translated all his works into German—a Norse romantic cycle 'Helge' (1814); another Oriental theme, 'Ali og Gulhyndi'; the tragedy 'Stärkodder' (1812); the poetic cycle 'Frederiksberg' (1817); the tremendous epic 'Nordens Guder' (1819), to which 'Hakon,' 'Baldur,' and 'Tors Reise' paved the way; 'Erik og Abel,' a tragedy (1820); and 'Dina' (1842), almost the only one of his late works with a gleam of the old fire. Consult his autobiography (1850-1), and the 'Life' by Arentzen (1807).

**Oehler**, ɛ'lër, Gustav Friedrich, German theologian: b. Ebingen, Württemberg, 10 June 1812; d. Tübingen 19 Feb. 1872. He studied at Berlin and Tübingen, subsequently taught at Basel and Tübingen, in 1840 became professor in the theological seminary in Schönlhal, and in 1845 was appointed professor of theology at Breslau. In 1852 he became head of the theological seminary at Tübingen. He was one of the most prominent Old Testament scholars on the conservative side. Among his works are: 'Introduction to Old Testament Theology' (1845); 'Outlines of Old Testament Knowledge' (1854); 'Relation Between Old Testament Prophecy and Heathen Soothsaying' (1861); 'Old Testament Theology' (1873-4), English translation (1874-5); and 'Manual of Symbolism' (1876). Consult: Knapp, 'Ein Lebensbild von Oehler' (1876).

**Oehme**, ɛ'më, Ernst Erwin, German painter: b. Dresden 18 Sept. 1831. He was the son and pupil of Ernst Friedrich Oehme, the landscape painter, attended the Dresden Academy of Art, and for a short time worked under Ludwig Richter; after which he made an artistic tour through Germany, Switzerland, England and France. He painted, in oils and water-colors, landscapes, architectural views, genre and portraits. The Court Theatre at Dresden was decorated by him; a series of tapestries was also painted by him in water-color, in imitation of Gobelin tapestry. His 'Stone Quarry in Saxony' (1860) is in the Dresden Gallery; and

he executed for Queen Carola of Saxony a collection of views of Compiègne. The most important of his remaining pictures include: 'Funeral in Spreewald'; 'Bear Hunt' (in water-colors); 'The Valley of Montafont.' His work is poetic in conception, but sometimes borders on the namby-pamby and the affected.

**Œil-de-Bœuf**, a small round or oval window. Such a window in the palace of Versailles gave the name *Salle de l'Œil de Bœuf* to the king's ante-chamber. Since the Renaissance the window has been used frequently with decorative intent as in friezes along the upper parts of buildings, and it is largely with such significance that the term is used in English.

**Œland**, *êlând*, Sweden. See **ÖLAND**.

**Œlwein**, *ôl'win*, Iowa, city in Fayette County; on the Rock Island & P. and on four lines of the Chicago G. W. R. R.; about 65 miles in direct line west by north of Dubuque. It was settled in 1873 by August Œlwein; was incorporated January 1888, and chartered as a city March 1897. It is in an agricultural region but it has considerable manufacturing interests. The Chicago Great Western railroad shops have 700 employees, and the trainmen, and those employed in the yards and roundhouses number about 300. The foundry has 100 employees. The educational institutions are the public schools and the Œlwein Business College. There are nine churches. The three banks have a combined capital of \$125,000. The government is vested in a mayor and a council of eight members, who are elected biennially. The city owns and operates the waterworks. Pop. (1890) 830; (1900) 5,142; (1910) 6,028.

FRED S. ROBINSON,  
Editor 'Œlwein Register.'

**Œnanthol**, *ê-nân'thöl*, in chemistry, a product of the dry distillation of castor-oil preferably in a vacuum. The immediate product of the distillation is mixed by shaking with a solution of carbonate of potash and then heated, when *œnanthol* ( $C_{15}H_{26}O$ ) separates as an oily colorless fluid with a strong aromatic odor, slight solubility in water, a boiling point of  $154^{\circ}C$ ., and at ordinary temperature, say  $17^{\circ}C$ ., a density of 0.827. By oxidation of *œnanthol*, or by direct oxidation of castor-oil, *œnanthyl'ic acid* ( $C_{15}H_{24}O_2$ ) is prepared; this is a fatty volatile acid now known to be a mixture of esters of capric and caprylic acids (see **ŒTROIC**), but originally supposed to be the acid giving the aster flower its odor.

**Œnanthyl'ic Acid**. See **ŒNANTHOL**.

**Œneus**, *ê'nūs*, in Greek mythology, the king of Pleuron and Calydon in Ætolia. He was the husband of Althæa, and by order of Diana his country was ravaged by the Calydonian boar. He was dethroned and imprisoned by the sons of his brother Agrius, but was rescued by his grandson Diomedes who restored the kingdom to his son-in-law Andræmon, Œneus being then too old to rule. He was afterward killed by the sons of Agrius.

**Œrsted**, *êr'stêd*, **Anders Sandøe**, Danish statesman, brother of Hans Christian Œrsted: b. Rudkjøbing 21 Dec. 1778; d. Copenhagen 1 May 1860. He studied philosophy and law at Copenhagen, was admitted to the bar in 1799, became a famous jurist, was appointed attorney-general in 1825, drew up the Constitution

granted in 1831, was cabinet minister 1842-8, and from October 1853 to December 1854 was prime minister, his speedy resignation being forced by his unpopular conservatism, a distinct departure from his earlier politics. He was impeached with his entire cabinet, but all were acquitted. Œrsted wrote on Hegelian philosophy, on Danish and Norwegian law (1822-3), on Scandinavian politics (1857), and an interesting autobiography (1856).

**Œrsted**, **Hans Christian**, Danish physicist: b. Rudkjøbing 14 Aug. 1777; d. Copenhagen 9 March 1851. His father was an apothecary and the boy assisted him, studied at Copenhagen, where he became assistant in the medical faculty in 1800, traveled in Europe 1801-4 and again 1812-13, and in 1806 was appointed professor of physics at Copenhagen. In 1829 he became director of the new Polytechnic of the same city, and in 1850 a privy councillor. His greatest work was the result of experiments on the magnetic needle with the electric current, which established the intimate interrelation of electricity, galvanism, and magnetism, and which were described in his 'Experimenta circa Effectum Conflictus Electrici in Acum Magneticam' (1820). Œrsted also wrote a valuable 'Manual of Mechanical Physics' (1844) and various studies in chemistry, physics, metaphysics, aesthetics, and popular science, all pervaded with his predominating thought of the unity of the sciences and their position as the servants of religion. His style was clear, picturesque, and attractive, and his works have been popular both in the original and in German versions. Consult the biography by Hauch and Forchhammer (1853).

**Œrtel**, *êr'têl*, **Johannes Adama**, German-American Episcopal clergyman and artist: b. Fürth, Bavaria, 3 Nov. 1823. After studying art in Germany he practised engraving until 1848, in which year he set up as a painter in New York. He painted 'Rock of Ages,' which became vastly popular and was reproduced in millions of photographs and chromolithographs. He took holy orders in 1867, has had more than one pastoral charge and was appointed professor of Christian Art in the University of the South; he is also a successful wood carver, confining himself to ecclesiastical and religious subjects in both departments of his activity.

**Œsæl**, *ê'zêl*, a Russian island. See **ŒSEL**.

**Œser**, *ê'zêr*, **Adam Friedrich**, German artist: b. Pressburg, Saxony, 17 Feb. 1717; d. Leipsic 18 March 1799. He was trained for his profession under the influence of Raphael Donner, 1730-9; he afterward was a pupil of Mengs and Dietrich at Dresden where he designed the decorations of the court theatre. Here he made the acquaintance of Winckelmann. In 1764 he was appointed director of the newly founded art school at Leipsic. Besides his professional activity as a teacher he did a great deal of decorative work, and won a reputation as a painter of ceilings. Among other things he executed a picture for the church of Saint Nicholas, and a number of minor decorative panels and drawings. As a sculptor he shows to advantage in the statue of Frederick Augustus the Just in Leipsic and of the Danish Queen Matilda in Celle (Aisne-et-Nord). His versatility is proved by his masterly etchings, 45 in num-

ber, some after the manner of Rembrandt, some in a highly original style of his own. He shared in Winckelmann's efforts after a reform in art through a study of the antique, but his own canvases give little evidence of Greek influence, and by his passion for allegorical compositions he is sometimes betrayed into the extravagances of the rococo school.

**Œsophagotomy**, ẽ-sõf-a-gõt'a-mĩ, a surgical operation for the relief of stricture of the œsophagus and the removal of foreign bodies lodged in it, when dilatation and other measures are of no avail. There are two forms of the operation, external and internal. External œsophagotomy consists in cutting into the œsophagus in front between the thyroid cartilage and the sternum, and extracting the foreign body with forceps, or dividing the stricture with a knife. Internal œsophagotomy, is usually resorted to for the relief of stricture, especially when of cicatricial origin. The stricture is divided by a cutting instrument (the œsophagotome) passed through the mouth. After the operation bougies are used to prevent recontraction. When the œsophagotome cannot be used, or inanition is imminent, gastrotomy (q.v.), or opening the stomach so that food can be given, is resorted to.

**Œsoph'agus**. See DIGESTION.

**Oesterley**, ẽs'tẽr-li, Karl (son of the following), German painter: b. Göttingen 23 Jan. 1839. After studying in the Hanover Polytechnic he went to Düsseldorf 1857 and began under Deger his essays as a religious painter. On a visit in Lübeck (where he copied Hans Memling's 'Passion of Christ,' 1865) he was attracted to landscape and architectural pieces, and was so successful in this domain that he thenceforth devoted himself to landscape. Since 1870 he has generally derived his *motif* from Norwegian scenery. His pictures are distinguished for their dazzling color, transparent atmosphere, distinctness in light and texture, and grandeur of conception. Among them are 'Midnight near Lofoden'; 'Mountain Gorge in Norway'; 'Romsdalsfiord'; 'Scene on the Coast of Northern Norway' 1879 (in the Museum at Breslau); 'Fishing on the Norwegian Coast'; etc.

**Oesterley**, Karl Wilhelm, German painter: b. Göttingen 20 June 1805; d. Hanover 28 March 1891. He was a pupil of Matthæus in Dresden, studied in Rome 1824-9, in 1831 was appointed professor of the history of art in the University of his native town and, in collaboration with Ottfried Müller, published 'Monuments of Art.' Meanwhile he was extending his artistic studies in Düsseldorf, Munich, and Paris. On the completion of his picture, 'Christ and Ahasuerus' (1844), he was appointed court painter of Hanover. The chief of his remaining works are 'Jephtha's Daughter' (1836); 'Christ Blessing Little Children' (1841); 'The Ascension' (in the chapel royal at Hanover), completed 1838; 'Scene from Bürger's "Lenore."' He produced also altar-pieces and portraits and designed stained-glass windows.

**Oetinger**, ẽt'ĩng-ẽr, Friedrich Christoph, German theologian: b. Göppingen, Württemberg, Germany, 1702; d. Murrhardt, Germany, 10 Feb. 1782. He was educated at the University of Tübingen and became reader of theology at

the University of Halle. In 1738 he took charge of the parish of Hirschau and gained the leadership of the Pietists in that section. His translation of several of the works of Swedenborg brought upon him ecclesiastical censure, but he was protected by the Duke of Württemberg and later was appointed superintendent of the churches in the district of Weinsberg. He subsequently held the same position in Herrenberg and afterward became prelate in Murrhardt. He wrote many theological treatises which have been edited by Ehmann (1858-63). Consult monographs by Auberlen (1848); Ehmann (1852); and Wächter (1885).

**O'Far'rell**, Michael Joseph, American Roman Catholic bishop: b. Limerick, Ireland, 2 Dec. 1832; d. Trenton, N. J., 2 April 1894. He was educated at the Seminary of St. Sulpice, Paris, and ordained to the priesthood in 1855. He went to Montreal where he was pastor of St. Patrick's and St. Bridget's churches and in 1869 accepted a call to New York as assistant in St. Peter's church. In 1881 became the first bishop of the then newly formed diocese of Trenton, N. J.

**Offa**, king of the Mercians: d. 796. He succeeded to the throne after Ethelbald, on defeating the usurper Beornred, 757 A.D. Kent and the East Saxons were brought under his rule, and the power of Wessex was crushed by a defeat in 779. He likewise defeated the Welsh, wrested from them part of their border lands, and to retain them within their new limits erected here the rampart known as Offa's Dyke (q.v.). With the consent of Pope Adrian I. he raised the see of Lichfield to the position of an archbishopric; and he had diplomatic intercourse with Charlemagne. Ethelbert, king of East Anglia, was murdered by his instigation and Offa then seized his kingdom. He founded the Abbey of St. Albans, and a grant by him to the See of Rome is supposed to have been the origin of Peter's Pence (q.v.).

**Offa's Dyke**, England, said to have been built by King Offa of Mercia in the 8th century, as a boundary between his dominions and those of Wales. It extends from the vicinity of Newmarket, in Flintshire, and traverses the counties of Flint, Denbigh, Salop, Radnor, Hereford, and Monmouth to Beachley, at the mouth of the Wye. Another dyke of a similar kind called Watts' Dyke, runs at distances of from ¼ mile to three miles apart from Offa's Dyke, in the same direction, through the counties of Flint and Denbigh. These dykes are supposed to mark the neutral ground on which the Welsh and Britons were at liberty to meet for transacting business.

**Offenbach**, Jacques, zhāk õf-ẽn-bāk, French Hebrew composer: b. Cologne 21 June 1819; d. 5 Oct. 1880. He entered the Paris Conservatoire in 1833, became proficient on the violoncello, and for some time played this instrument in the orchestra of the Opera Comique. Later he was conductor of the orchestra at the Theatre Français, and in 1855 opened the Bouffes Parisiens, where he enjoyed immense popularity. There were presented many of his most popular works, 'Orphee aux Enfers' (1858); 'Geneviève de Brabant' (1860); 'La Belle Hélène' (1865); 'La Barbe Bleue' (1866); 'La Grande Duchesse' (1867); 'La

## OFFENBACH—OFFERINGS AND SACRIFICES

Princesse de Trebizonde' (1870); 'Madame Favart' (1878). From 1866 he devoted himself entirely to composition. His last opera, and the one that he considered his best, was 'Les Contes d'Hoffman' (1881), successfully produced at the Opéra Comique after his death. Offenbach was a clever musician, but wrote for the passing hour, and probably did not do himself full justice. He was the originator of the opera-bouffe, and was imitated by many who never attained his melody or comic force. Consult Martinet, 'Offenbach, sa Vie, et son Œuvre' (1892).

**Offenbach**, ôf'fën-bān, Germany, a town in the Grand-duchy of Hesse, five miles southeast of Frankfort, on the left bank of the Main. It is well and regularly built, and has an old castle, formerly the residence of the princes of Isenburg, the modern palace of the prince of Isenburg-Birstein, a town-house, several churches, a synagogue, and theatre. Offenbach is the most active manufacturing town in the state. Its industries include fancy leather goods, such as pocket-books, portfolios, and traveling bags; and there are manufactures of aniline, celluloid, perfumery, stearin, vaseline, lacquer, and other chemical products, sewing and other machines, and machine tools; paper of various kinds, boots and shoes, type-founding, printing. Pop. about 53,000.

**Offerings and Sacrifices**, gifts offered to the Deity. Sacrifice differs from almsgiving as a religious service, or from contributions made merely for the purpose of supporting a system of external religion, in being offerings made directly from the worshipper to the Supreme Being. They may, however, under proper authority, be applied to charitable or religious uses; to the maintenance of the priesthood, or to the celebration of solemn feasts in which the worshipper and his friends, together it may be with the priests, and under the presiding presence of the Deity may partake.

The origin of sacrifice is a point much disputed; the two opposed views being that of a primeval appointment by the Deity, and that of a spontaneous origination in the instinctive desire of man to draw near to God. The universality of sacrifice has been urged in favor of the hypothesis of a primitive institution by Divine command, but the more legitimate inference from this circumstance appears to be in favor of the opposite view. Of the symbolic character of sacrifice there are various kinds or degrees, all having in common the acknowledgment of dependence on the one hand and of protective power on the other. These may be represented under three heads—(1) propitiatory, or designed to conciliate generally the favor of the Deity; (2) eucharistic, or symbolical of gratitude for favors received; (3) expiatory, or offered in atonement for particular offenses. To a different class may be assigned deprecatory sacrifices designed to avert the arbitrary wrath or appease the wicked disposition of deities.

Among the customs of various peoples in regard to sacrifice, those of the Jews stand out as preeminently worthy of attention, first because of their very express and explicit claims to a divine origin; secondly, because of their singular and remarkable character; and lastly, because of their connection with the Christian religion.

The origin of the Jewish sacrifices is traced to the earliest times. We are told in the book of Genesis (ch. iv.), that "in process of time" Cain and Abel brought each an offering to the Lord, and the different characters and results of these offerings are recorded. After the flood Noah offered a sacrifice "of every clean beast and of every clean fowl," an apparent intimation that the distinction between clean and unclean animals had already been made, and consequently of a prior divine appointment of sacrifice. Abraham, Isaac, and Jacob offered sacrifices in which appeared a circumstance peculiar to the Jewish economy, that of a covenant between the offerer and the Divine being, of which the sacrifice was accepted as a sign. When Moses demanded the manumission of the Israelites from their bondage in Egypt, the plea which he presented to Pharaoh was that they might go three days' journey into the wilderness to sacrifice to the Lord. It was when the deliverance had actually taken place, and during their sojourn in the wilderness, that the Jewish ceremonial law with its elaborate ritual of sacrifice was given (accepting the ordinary traditional view regarding the so-called Mosaic legislation). Into the details of this ritual, with its surrounding observances, so amply detailed in the book of Leviticus, we cannot enter. The burning upon the altar of animals offered in sacrifice is among the commonest of the forms of sacrificial rites both among the Jews and Gentiles. The Jewish sacrifices consisted mainly of burnt-offerings (of clean animals) daily, with double offerings on sabbaths, and special offerings at festivals, unlimited in extent, and which, being partaken of by the people, were called peace-offerings. Such sacrifices, called hecatombs, were also common among the Greeks and Romans. Meat-offerings (of flour, oil, and wine) accompanied the burnt-offerings. Sin-offerings (various) at special feasts and at each new moon were general expiatory offerings, besides which trespass-offerings were made privately on certain specified occasions, as well as in expiation of particular offenses. The most remarkable sin-offering was the well known one of the two goats on the great day of atonement. Incense was offered every morning and evening. Offerings were made separately, first for the priests and afterward for the whole people. What is most remarkable about the Jewish sacrifices was their restriction to one particular place, the tabernacle, and later the temple (but see Ex. xx. 24). Offerings on high-places were forbidden, and are always noticed with reprobation as the indication of a rebellious spirit. The view of Maimonides among the Jews, and of Warburton and others among Christian divines, was that sacrifices were not so much divinely appointed, as divinely permitted under restraints among the Jews, "lest," as it is expressed by Ephraim Syrus, "they should despise a naked religion and attach themselves to false gods." It is added in support of this view, that when religion was more fully established the prophets constantly deprecated sacrifice, but this is hardly a fair account of what the prophets did. The prophets, indeed, with one voice unite in affirming the views of sacrifice represented by Samuel in his exhortation to Saul, that "to obey is better than sacrifice," and of our Lord, who, according to Saint Matthew,

repeatedly cited the authority of the prophets for the saying that God will have mercy and not sacrifice, but it is clear that these statements were not directed against the established usage of sacrifice, but against an unreasonable reliance on them as a substitute for moral virtues.

Of the sacrifices of the Gentile nations space will not permit us to say much. They were evidently, as has been said, in many cases at least, the result of natural impulses developed by tradition, or cultivated by priestly care into a system. The powers of nature, or the most prominent objects, celestial or terrestrial, in which those powers resided, were commonly their exciting causes; while the terror of natural convulsions, and still more the disorders and miseries of human life, conjured up malevolent beings, whose wrath was only to be deprecated by blood, and sometimes by the blood of those dearest to the offerer. Here, again, human ingenuity came into play, and not animals alone, but slaves and captives, were sacrificed freely to redeem the lives of friends and kindred. Among many of the eastern nations surrounding the Jews human sacrifices were common. They were so particularly among the Phœnicians. Some traces of this barbarous custom may be found in legendary times even among the Greeks and Romans. Numerous legends hang upon the circumstance that the wrath of some divinity is only to be appeased by the sacrifice of a human victim to be recognized in some special way, or sometimes of a continued series of such victims. In one other respect only do the heathen sacrifices, including those of the Greeks and Romans, demand special notice, as differing materially from those of the Jews in the frequent inclusion among them as a sacrifice acceptable to the Deity of the chastity of women. This is always denounced in the strongest terms by the Hebrew prophets. The sacrifices of the Greeks and Romans, like those of the Jews, were either bloody or bloodless, the former usually accompanied by libations of wine and by incense. They were frequently used as a means of consulting the gods, procuring omens, etc., and consequently for political purposes.

Of the universality of sacrifice the annals of almost every people bear record. The ancestors of nearly all the existing races in Europe practised human sacrifices, and similar usages widely prevailed in Africa and America, as well as in Asia. Few religions, whether ancient or modern, have omitted sacrifices from among their rites. The Buddhists offer only first-fruits and flowers; the Mohammedans give alms, but offer no direct sacrifices. The Roman Catholic, Greek and Anglican Churches make the service of the Eucharist a service of sacrifice each in a somewhat different sense or degree. The introduction of Christianity had the effect of indirectly putting an end to Jewish sacrifices, and of directly abolishing heathen sacrifices in the Roman Empire. These latter were prohibited by the Emperor Theodosius in 381.

**Offertory**, in the Roman Catholic Church, is that portion of the service of the mass in which the priest offers to God upon the altar the bread and wine which are to be consecrated.

In the music of the mass the term offertory is used to designate the antiphon or music ap-

propriated to that part of the service above designated.

In the Anglican Book of Common Prayer the term offertory is applied to that portion of the service during which the alms are collected among the people, whether during the service of the Holy Communion or not, while certain prescribed sentences from Scripture are being said or sung. The alms are then offered by the officiating clergyman, being laid on the altar usually with an ascriptive address to God. When the Lord's Supper is celebrated the unconsecrated bread and wine are offered at the same time.

**Office, Divine** (Lat. *Officium divinum*) in the Roman Catholic Church, a general designation since the 9th century for the services of the canonical hours (q.v.). These services or offices are prescribed to be said each day by bishops, priests, deacons and subdeacons in the Roman Catholic Church. See **BREVIARY**; **LITURGY**; **MISSAL**.

**Office Fixtures.** See **LITERARY LABOR-SAVERS**.

**Official Plants** (Lat. *officinalis*, of the shop, from Lat. *officina*, shop), plants which are used in medicine, and therefore sold in the druggists' and apothecaries' shops. The term "official" was formerly—though erroneously—used as a synonym of "official," meaning preparations recognized by the officials in charge of the compilation of pharmacopœias. Many drugs and plants which are not official are sold in the shops, and are therefore official.

Official plants include the anthelmintics—pinkroot, wormseed, kooosso, santonin, malefern, pumpkin-seed, etc.; the astringents—galls, catechu, kino, oak-bark, roses, geranium, blackberry, etc.; the bitters—quassia, gentian, boneset, goldthread, dogwood, wild cherry, cinchona, chamomile, snakeroot, angostura, etc.; the aromatics—cinnamon, cloves, nutmeg, allspice, cardamom, ginger, eucalyptus, etc.; the cardiacs—digitalis, veratrum, arnica, aconite, etc.; the antispasmodics—valerian, asafoetida, camphor, hops, etc.; the analgesic, opium; the mydriatics—belladonna, hyoscyamus, stramonium; the excitomotor, nux-vomica; the depressomotors—calabar bean, lobelia, gelsemium, etc.; the alteratives—colchicum, guaiac, sarsaparilla, sassafras, etc.; the emetics—ipecacuanha, squill, bloodroot, etc.; the cathartics—tamarinds, castor-oil, rhubarb, aloes, senna, colocynth, elaterium, podophyllum, etc.; the diuretics—broom, buchu, uva ursi, juniper, copaiba, cubeb, cantharides, etc.; the diaphoretic, jaborandi; the expectorants—lobelia, senega, benzoin, etc.; the demulcents—slippery elm, Iceland moss, licorice-root, sassafras, tapioca, arrowroot, sago, barley; the emmenagogues—savine, rue, parsley, apiol, etc.; the oxytocics—ergot and cotton-root; besides many others, all these being also official. Certain other plants are official, such as catnip, tansy, skullcap, liverwort, etc. Consult Potter, 'Materia Medica, Pharmacy and Therapeutics' (1902).

**Og**, according to the Hebrew Scriptures, the king of Bashan, defeated by the children of Israel at Edrei (Num. xxi. 33). He is said by rabbinical writers to have been one of the giants who lived before the flood, and escaped the deluge by climbing to the roof of Noah's



ark. Noah fed them that they might be to men of after times a proof of the power of God, who had created and destroyed such monsters. In the war of Og against the Israelites he took up a mountain four miles in circumference to throw down upon Israel, when it was honey-combed by ants sent by Jehovah; fell and overwhelmed him. His teeth grew so quickly that they entered the mountain and held him fast, so that Moses could kill him. To give an idea of his gigantic size, the rabbins say that Moses, who according to their account was 6 ells high, and had a battle-ax of the same length, was obliged to make a leap of 6 ells in order to strike his ankle-bone. He bled to death of the wound.

**Ogam**, óg'am, or **Ogham**, an ancient alphabet or system of lettering, formerly in use among the Celtic peoples of Ireland, Scotland, and Wales, chiefly found in inscriptions on stone, but also, though more rarely, in books. Ogams consist chiefly of straight lines, mostly vertical and oblique, horizontal lines and curves being



Ogam Inscription, from a stone found near Ennis.

sparingly used. They derive their significance partly from their position on a continuous horizontal stem-line along which they are written, some of the characters being drawn resting on the horizontal line as a base, others depending from it, and others intersecting it. This horizontal line, however, really represents a perpendicular line, namely that formed by the angle of the upright stone on which ogams were originally cut. Authorities differ as to the total number of letters represented in the alphabet, some making 16, others 25. According to some scholars a single vertical stroke resting on the line represents *h*; two contiguous strokes *d*; three *t*; four *c*; five *qu*. A single horizontal stroke depending from the line stands for *b*; two for *l*; three for *w* or *f*; four for *s*; five for *n*. The letters *m*, *g*, *ng*, *a* or *st*, *r*, are represented by one to five oblique strokes right to left crossing the line; the vowels *a*, *o*, *u*, *e*, *i*, by one to five vertical strokes crossing the line. Diphthongs are represented by curves or compound letters.

The age of this alphabet has been the subject of considerable discussion. The best authorities seem now to be agreed that it cannot be traced beyond the introduction of Christianity. The object of its construction seems not to be explained, but the most ancient ogams are all inscribed on stone. Ogams are found chiefly in Ireland, but some have been found also in Scotland, Wales, the Shetland Islands, and even in England, the total number known only amounting to about 300. The Celtic names in the inscriptions are frequently Latinized. There are numerous papers and discussions regarding them in the publications of archæological societies.

**Og'den, Aaron**, American soldier: b. Elizabethtown, N. J., 3 Dec. 1756; d. Jersey City 19

April 1839. He was graduated at Princeton College in 1773; in 1777 joined the army, and served with distinction during the whole Revolutionary War, serving at one time under Lafayette and obtaining the personal commendation of Washington. On the close of the war he was discharged with the rank of major, afterward practised law, and was a Presidential elector in 1800. He was one of the commissioners for adjusting the disputed boundary between the States of New York and New Jersey; from 1801 to 1803 was United States Senator; and in 1812 was governor of New Jersey. He was president of the Society of the Cincinnati during the last decade of his career.

**Ogden, Francis Barber**, American inventor: b. Boonton, N. J., 3 March 1783; d. Bristol, England, 4 July 1857. He was aide-de-camp to General Jackson in the battle of New Orleans; is said to have been the first to apply the principles of the expansive power of steam, and the use of right angular cranks in marine engines; and in 1813 obtained a patent for condensing engines of low pressure and with two cylinders, in which the above principles were utilized. In 1817 the first engine ever built on these lines was constructed by him in Leeds, England. The first screw propeller successfully introduced into practical use was launched by John Ericsson on the Thames, May 1837, and was called the Francis B. Ogden. The building of the first screw propeller for American waters, the iron vessel Robert F. Stockton, was superintended by Mr. Ogden in Liverpool, where he was United States consul in 1829-40. In 1840-57 he was consul at Bristol.

**Ogden, Frederick Nash**, American military officer: b. Baton Rouge, La., 25 Jan. 1837; d. New Orleans, La., 25 May 1886. After engaging in mercantile life from boyhood he entered the Confederate army at the outbreak of the Civil War, and subsequently became major of heavy artillery and lieutenant-colonel of cavalry. At the close of the War he resumed commercial life, and in 1868 founded the Crescent City Democratic Club, a powerful political organization. He was made major-general of State militia; and was president of the Red Cross Association of Louisiana during the yellow fever epidemic of 1878.

**Ogden, Herbert Gouverneur**, American cartographer: b. New York 4 April 1846. He was educated in private schools; in 1863 was appointed an aid in the United States Coast and Geodetic Survey and an assistant in 1869. He served with the army on the defenses of Washington in 1864, accompanied the Nicaragua expedition in 1865, and the earliest naval exploring expedition to the Isthmus of Darien in 1870 as topographer, and had charge of the party sent to locate the international boundary between British Columbia and Alaska, in 1893. He is a recognized expert in topography and cartography.

**Ogden, Robert Curtis**, American merchant and philanthropist: b. Philadelphia, Pa., 20 June 1836. Since 1885 he has been a retail merchant as a member of the John Wanamaker firm. He is best known by his work in behalf of the cause of education in the South. He is president of the board of trustees of Hampton Institute, a trustee of Tuskegee Institute, and president of

the Southern Educational Board and the Conference for Education in the South. His work in this line has been everywhere recognized as most efficient, his efforts being directed chiefly toward providing education for both negroes and illiterate whites through Southern agencies and in friendly co-operation between Northerners and Southerners. In 1903 Tulane University gave him the degree of LL.D. in recognition of his services. He has published 'Samuel Chapman Armstrong,' the Founder's Day address at Hampton Institute, 1894; 'Pew Rents and the New Testament' (1892); 'Sunday School Teachers' (1894).

**Ogden, Ruth.** See IDE, FANNIE OGDEN.

**Ogden, Utah,** city, county-seat of Weber County; at the junction of the Ogden and Weber rivers, and on the Southern P., Union P., Rio Grande W., Oregon S. L., and Ogden & N. W. R.R.'s; about 35 miles north of Salt Lake City, and 10 miles from Salt Lake. It was founded in 1848 and in 1850, under the direction of Brigham Young (q.v.), it was laid out as a city. In 1851 it received its charter. The charter now (1904) governing the city is in accordance with the general law of the State for the government of cities and was passed by the Legislature in 1898. It is in a fertile agricultural region, and in the vicinity of valuable mines. The opening of the Ogden Cañon is at the city limits, and its grand and picturesque scenery brings many tourists to the place. The water-power of the falls is used for the electrical works which supply power, light, and heat for Ogden and Salt Lake City. The chief industrial establishments are canneries, pickle factories, beet-sugar factory, woolen mills, broom factory, and brick and tile yards. It has an extensive trade in its manufactures and farm products, and is the distributing centre of quite a region with which Ogden is connected by railroads. The educational institutions are the State Industrial School, State Institutions for the Deaf, Dumb, and Blind, the Weber State Academy (Mormon), the Sacred Heart Academy (R.C.), and public and parish schools. The government is vested in a mayor, who holds office two years, and a council. The mayor appoints, subject to approval by the council, the administrative officials except the treasurer, clerk, auditor, police justice, and attorney, who are elected by the people. Pop. (1910) 25,580.

**Ogdensburg, N. Y.,** city, port of entry, in Saint Lawrence County; at the confluence of the Saint Lawrence and Oswegatchie rivers, and on the New York C. & H. R., and the Rutland R.R.'s; about 170 miles, in direct line, northwest of Albany, the State capital. It is connected by ferry with Prescott, Ont. It is at the foot of the deep-water navigation of the Great Lakes, and has unusual facilities for transportation. It has direct connection by rail with New York city and Boston, and steamer connection with all the lake and river ports. Shipping and wholesale dealing in lumber, grain, and coal are the most prominent industries. Several fleets of vessels are owned here. Other important industries are the manufacturing of silk, flour, gloves, dress skirts, leather and brass goods, lumber and lumber products. The importations at the port of entry, for 1903, amounted to \$17,251,981; exportations, \$4,543,346. The value of the raw silk imported was \$13,839,998. The amount of

lumber cleared was 113,315,000 feet. The number of vessels which arrived was 1,880; departed, 1,757, with aggregate tonnage of 925,399. The custom dues amounted to \$294,266.89. The prominent public buildings are the custom-house, a beautiful town-hall, an opera house, two handsome club houses, a State armory, and seven large churches, including the Roman Catholic Cathedral. Among the charitable institutions the most prominent is the Saint Lawrence State Hospital for the Insane; established and equipped at a cost of several millions, and supervised and superintended by specialists, it is an exponent of world's most effective and humane treatment of the insane. Other institutions are the City Hospital, United Helpers' Home, Saint John de Deo's Hospital (quarantine hospital), an orphanage and a home for the aged. The educational institutions are Saint Mary's Academy (free), public school free academy, public and parish schools, and a public library. The library is built on a site of great beauty, on the river front, and surrounded by several acres of green lawn and trees. The building cost \$50,000 and was paid for by the citizens of the city. By an act of the Legislature, in 1901, the corporate limits of the city were extended. Pop. (1890) 11,662; (1900) 12,633; (1910) 15,933.

FRED VAN DUSEN, PH. D.,

*Principal Ogdensburg Free Academy.*

**Ogé, Jacques Vincent,** zhāk vān-sōn ô-zhâ, Haitian revolutionist: b. Dondon, Haiti, about 1755; d. Hayti 1791. He was a mulatto, but was born free and as a young man served in a German army there. In 1789 he represented Haiti in the Constitutional Assembly and when he returned to Haiti he took up the cause of the slaves. Unsuccessful in his petitions to the Assembly, he formed a company and in 1790 led a revolt. He was victorious in several battles, but was ultimately defeated; the plea that his life should not be forfeited if he surrendered was disregarded and he was tried and sentenced to death.

**Ogee, ô-jě',** in architecture, a molding consisting of two members, one concave and the other convex. An ogee arch is a pointed arch, the sides of which are each formed with a double curve. It is generally introduced over doors, niches, tombs, and windows, its inflected curves weakening it too much to permit of its application for the support of a great weight.

**Ogeechee, ô-gě'chě,** a river in Georgia, has its headwaters in Greene County, flows southeast into Ossabaw Sound, a course of about 200 miles. Savannah is 17 miles north of the mouth of the river. Where the waters enter the sound a number of islands have been formed, largest of which is Ossabaw. The river is navigable for small steamers for some distance from the ocean.

**Oggione, ôd-jō'ně, Marco da,** Italian painter: b. Oggiono, Lombardy, about 1470; d. between 1530 and 1540. He studied religious painting under Leonardo da Vinci as early as 1490, and was the oldest of that master's scholars. One of the finest of his pictures is 'The Three Archangels' in the Brera at Milan. He is, however, best known for his copies of 'The Last Supper' of Leonardo, one of which is at the Royal Academy, London, another in the Convent of Castellazzo, near Milan, and a third at Saint Petersburg. The pretty picture at

Hampton Court of 'The Infant Christ and Saint John Kissing,' generally attributed to Leonardo, is undoubtedly the work of Oggione whose creations are not unfrequently credited to his greater teacher.

**Ogilvie**, ô'gl-vî, **Clinton**, American painter: b. New York 28 Dec. 1838. After studying under James McDougal Hart (q.v.), he started on his student-travels in Europe, and spent much time in the art galleries and studios of Paris (1866, 1872-3). In 1864 he was elected an associate of the National Academy. He has been successful as a landscape painter and has generally gone to Switzerland or France for his subjects. His best known pictures include: 'The Valley of Schwytz, Switzerland'; 'Lake Como near Bellagio'; 'Among the Adirondacks'; 'At Eaux Bonnes, France'; 'Argelès'; and 'Saint Barthelemy, near Nice.'

**Oglesby**, ô'glz-bî, **Richard James**, American soldier and lawyer: b. Oldham County, Ky., 25 July 1824; d. Elkhart, Ill., 24 April 1899. He removed with an uncle to Decatur, Ill., in 1836, studied law there while engaged in the carpenter's trade and gained admission to the bar in 1845. He served in the Mexican War with the rank of lieutenant and later entered the Louisville Law School, where he was graduated in 1848. In 1851 he resumed his law practice in Decatur, Ill., and in 1860 was elected to the State senate from which he resigned to enter the Union army. At Forts Donelson and Henry he performed distinguished service and in 1862 was promoted brigadier and later major-general of volunteers. He was at the battles of Pittsburg landing and Corinth and was compelled to resign in 1864 because of his wounds. In 1865-9 he was governor of Illinois, and in 1872 was re-elected but declined the office to become United States senator in 1873-9, and was again governor in 1885-9.

**Oglethorpe**, ô'gl-thôrpe, **James Edward**, English soldier and colonist: b. London 21 Dec. 1696; d. Cranham Hall, Essex, 1 July 1785. In 1714 he joined the army of Prince Eugène, as aide-de-camp, whom he served with distinction in the campaign against the Turks, 1716-17, especially at the siege and capture of Belgrade (q.v.). In 1722 he was sent to Parliament as member for Haslemere. Becoming acquainted with the abuses of the debtor's prison in London, he made them known to Parliament, and was appointed chairman of a committee for their investigation. His work in behalf of insolvent debtors, thus begun, was continued in his project for their colonization in North America, in connection with which he also aimed at an asylum for oppressed Protestants of the European Continent. With others, in 1732, he obtained a charter for a tract of land between the Altamaha and Savannah rivers, and in January 1733 Oglethorpe, with a party of colonists, arrived at Charleston; soon afterward he founded Savannah (q.v.), and for 10 years he served as governor of the colony of Georgia, named in honor of George II. By his defense of the colony and neighboring territory of the South against encroachments of the Spaniards and Indians from Florida, and his efforts to secure the trade of the Cherokees, he rendered services to England quite beyond the ordinary work of colonial administration, and for Georgia laid the foundation of a stable commonwealth.

Besides the defenses which he gathered in the colony, in 1738 he brought a regiment of volunteers from England, and in the war of Jenkins' Ear (see *COLONIAL WARS IN AMERICA*), he vigorously laid siege to Saint Augustine, but the inadequacy of his force prevented him from capturing the place. He achieved an important success in holding Amelia Island against the Spanish attack, and another by his victory at Frederica. In 1743 Oglethorpe returned to England, and two years later was made major-general, having been acquitted of charges brought against him for the failure of his attempt at Saint Augustine. He had brought himself into financial straits by advancing money for defensive needs in Georgia. In 1745 he served against the Stuart invaders, and pursued the Jacobite fugitives, was court-martialed for failing to overtake them, but honorably acquitted. Oglethorpe and his fellow trustees of Georgia surrendered their charter in 1752, and the colony became a royal province. In 1765 he was raised to the rank of general in command of all the king's forces. His interest in American affairs never abated, and he was one of the first to wait upon Mr. Adams, after his arrival in England as ambassador, to whom he expressed his esteem and regard for America, and his satisfaction at the termination of the difficulties between Great Britain and her colonies. Consult: Sparks, 'American Biography,' 2d series, Vol. II., for a memoir of Oglethorpe by W. B. O. Peabody; Wright, 'Memoirs of James Oglethorpe' (1867); and Lecky, 'England in the 18th Century,' Vol. I. (1879).

**O'Gorman**, **Thomas**, American Roman Catholic prelate: b. Boston, Mass., 1 May 1843. His early education was obtained in Chicago and Saint Paul, and from his 10th to his 22d year he studied in France. From 1867-78 he was pastor at Rochester, Minn., from 1878-82 a member of the Paulist community, New York city, and from 1882-5 pastor at Faribault, Minn. Chosen first president of Saint Thomas' College, Merriam Park, Saint Paul, he was for four years its professor of dogmatic theology, and in 1890 was called to the chair of Modern Church History in the Catholic University, Washington, D. C. On 19 April 1896 he was consecrated bishop of Sioux Falls by Cardinal Satolli in Washington. Bishop O'Gorman is an authority on mooted historical questions, and the author of a 'History of the Roman Catholic Church in the United States.' When, in 1902, President Roosevelt sent a commission to Rome to treat with the Vatican on Philippine matters, Bishop O'Gorman was chosen one of the members. At present (1905) his diocese of Sioux Falls has a Catholic population of about 45,000, including whites and Indians; 80 priests; 133 churches; 23 parochial schools, and 3 hospitals.

**Ogowai**, ô-gô-wâ', or **Ogové**, ô-gô-wâ', Africa, a river of the French Kongo, with a densely forested and wide delta on the western coast near Cape Lopez. Its sources are in the Cristal Range, about 130 miles west of Stanley Pool, and it reaches the Atlantic after a north-westerly, circuitous course of about 700 miles, 200 miles of which from the mouth are navigable by small steamers. It has several tributaries, the chief of which are the Ivindo and the Lolo. The river was discovered by Du Chaillu in 1856.

**O'Hara, ð-här'a, Theodore**, American soldier and poet: b. Danville, Ky., 11 Feb. 1820; d. near Guerryton, Barbour County, Ala., 6 June 1867. At one time an officer in the United States Navy, he was connected with the Lopez and Walker movements, and served as captain and major in the Mexican War. In the Civil War he was a colonel in the Confederate service. His famous poem, 'The Bivouac of the Dead,' was written in commemoration of the Kentuckians killed in the battle of Buena Vista during the war with Mexico.

**O'Higgins, ð hig'inz** (Sp. ð-é'gëns), **Ambrosio**, South American administrator: b. County Meath, Ireland, about 1730; d. Lima, Peru, 18 March 1801. His real name was Ambrose Higgins. His uncle, who was a Spanish priest, had charge of his education and sent him to South America. He went to Buenos Ayres first and then to Chile, where he was a trader and peddler for several years. He entered the Spanish army, distinguished himself in the Araucanian wars, and rapidly rose in rank until in 1788 he was made captain-general of Chile. His rule there proving very successful, he was given the title of Marquis of Orsino, and appointed viceroy of Peru in 1796, where he also proved an excellent ruler.

**O'Higgins, Bernardo**, Chilean soldier and dictator: b. Chillan, Chile, 20 Aug. 1776; d. Lima 24 Oct. 1842. He was a natural son of Ambrosio O'Higgins (q.v.). He was educated in England, where he became a republican under the influence of Miranda and others. He returned to Chile in 1802, and in 1810 joined the Chilean revolutionists; in 1813, when Carrera was deposed from the supreme command of the army, O'Higgins was appointed to succeed him. He met with constant opposition from Carrera and his faction, and civil war was imminent, when a Spanish army from Peru entered the country, and the two factions combined to withstand the Spanish attack. The Chileans under the command of O'Higgins met the Spaniards at Rancagua, 2 Oct. 1814, and were defeated on account of Carrera's failure to bring the reinforcements expected. The leaders fled across the Andes, but O'Higgins in 1817 joined the invasion under San Martin, as one of the chief lieutenants. The charge under his leadership decided the Chilean victory at Chacabuco, 12 Feb. 1817. He was then made dictator of Chile—after San Martin had declined the office—and under his rule the independence of Chile was formally declared and the Spaniards driven out. His administration was an efficient one, but his republican sentiments and his attempts to establish a representative constitutional government aroused the opposition of the aristocrats. The aristocratic party, joined by the adherents of Carrera, rebelled and finally deposed him in 1823, and he then went to Lima, Peru.

**O'Higgins, Chile**, an inland province bounded north and west by Santiago, by Argentina on the east, and by Colchagua on the south. Area, 2,524 square miles. Capital, Rancagua (q.v.). The surface in the west is level and is devoted to agriculture and pasturage; in the east the country is on the slope of the Andes and in this mountainous region gold and other metals are mined. The principal rivers are the Maipo and the Raipel.

**Ohio** (Iroquois, *Ohionhiio*, "beautiful river," popular name, **BUCKEYE STATE**), a State in the north central part of the United States; bounded on the north by Michigan and Lake Erie, on the east by Pennsylvania and West Virginia, on the south by West Virginia and Kentucky, on the west by Indiana. The boundary lines dividing Michigan and Indiana from Ohio, and Pennsylvania from Ohio to the Ohio River, are straight lines, the southern and southeastern boundaries are formed by the Ohio River. The State is between lat. 38° 27' and 41° 57' N. and lon. 80° 34' and 84° 49' W. The maximum length, north and south, is 210 miles, and, east and west, 215 miles. The area is 41,060 square miles, of which 300 square miles are water surface. In size it ranks thirty-second among the States, and was the fourth State admitted into the Union.

**Topography.**—That portion of the State bordered by the Ohio River and Lake Erie has an irregular boundary. The course of the Ohio along the border is 436 miles; the lake shore is 230 miles, giving the State a navigable water front of 666 miles. The largest inlets from Lake Erie are Sandusky and Maumee bays. In the portion of the Lake between those bays are a number of islands, several of which belong to Ohio. The general surface of the State is a rolling plain, from 300 to 500 feet above Lake Erie, or from 900 to 1,200 feet above the sea. Some portions have an altitude of 1,500 feet; in Logan County, the western part of the State, is the highest point, 1,540 feet altitude, and the lowest is the shore of the Ohio near Cincinnati. The divide between the rivers of Lake Erie and those of the Ohio River is a low ridge which crosses the State from the middle of the western border, in Mercer and Darke counties, to near the northeastern boundary, in Trumbull County. The river channels are cut deep in many parts of the State and many of the banks are massive rugged rocks and huge boulders. The best harbors on the lake shore are Ashtabula, Cleveland, Sandusky, and Toledo.

**Hydrography.**—There are two drainage basins in the State; the one sloping north toward Lake Erie, and the other south toward the Ohio. The rivers flow through valleys, some of which were at one time flood plains, but many of the streams have cut channels from 100 to 200 feet in depth and flow through low valleys. The Ohio River is in some places from 500 to 600 feet below the hills on either side and a considerable distance below the tops of the banks. The streams which flow south are the longest and deepest. The largest are the Muskingum, Mahoning, Hocking, Scioto, Little Miami and Great Miami. The longest wholly within the State is the Muskingum. This river has been made navigable by slackwater and other improvements for about 100 miles from its mouth. The chief rivers in the northern basin are the Maumee, Portage, Sandusky, Huron, Vermilion, Black, Rocky, Cuyahoga, and Chagrin. Many of the rivers of the State furnish considerable water-power and are a great aid in the development of manufacturing industries. There are no large lakes in the State, but in many parts there are groups of small lakes noted for their beauty. In Summit County there are several small lakes. The buried river channels which are found in many places in Ohio are of interest to the geologist.

These channels have been filled in by sand, gravel, etc., and now the waters of rivers that once followed deeply excavated channels, are flowing over beds far above their former bottoms.

**Geology.**—There are no great breaks of the strata, nor any great variations in the geological structure of the whole State; the underlying sedimentary rocks show only a slight inclination from the horizontal. There is a broad fold whose axis extends from the northeastern part of Indiana southeast to near Cincinnati, then crosses into Kentucky, extending to about the central part. This is called the Cincinnati Arch or anticlinal. From this arch the strata dip westward to the coal fields of Illinois and south and southeast under the Alleghany coal fields. The elevation of this arch must have occurred at the close of the Lower Silurian period and prior to the beginning of the Upper Silurian period. The geological formations which are exposed are the Lower and Upper Silurian, the Devonian, the Carboniferous, and the drift. In the Lower Silurian near Cincinnati may be found the oldest rocks, called the Cincinnati Group. In but few localities is there found such a variety and richness of the fossil remains as in the beds of limestone and clay or marl in this vicinity. On the crown of the Cincinnati Arch, near the northern part, the formations of the Upper Silurian area may be seen. Near Sandusky is the Salina group, the formation containing salt as at Syracuse, N. Y. Here also are beds of gypsum. In the western part and on the islands of Lake Erie is the water lime which is found in the Helderberg region of New York State. It flanks the Cincinnati Arch on each side. The coralliferous limestone, the chief element of the Devonian in the State, forms two outcropping belts on opposite sides of the Cincinnati Arch, one crossing the northwest corner of the State, and the other extending from Sandusky to Columbus. Coralliferous limestone forms the surface rock of Kelley's Island. This same rock is quarried at Kelley's Island, Sandusky, Columbus, and other places in the State. The capitol at Columbus is built of this stone. In the coralliferous rocks at Sandusky and Delaware are found the remains of fossil fish. The black shale, similar to that found in the Genesee Valley in New York State, is in the northwest corner of the State, and also a belt from 10 to 20 miles wide, extends from the mouth of the Huron River to the Ohio. It is a black bituminous shale containing from 10 to 20 per cent of carbonaceous matter. It is the source of a large part of the oil and gas of Ohio. In this shale are found the remains of large fossil fishes. Bordering on the lake shore from the Pennsylvania line is a mass of shale, the upper member of the Devonian, and the continuation of the formations found in the Portage and the Chemung Valley of western New York. The eastern part of the State is underlaid by the Carboniferous formation, an extension of the great Alleghany coal fields. The coal measures are composed of strata of shale, sandstone, coal, limestone, and fire clay with iron ores are found in the eastern and southeastern part. These coal measures have an area of 10,000 square miles in Ohio. There are no formations later than the Carboniferous until the period of the Glacial drift. All the State except the southeastern por-

tion was covered with ice. The drift deposit in many places is several hundred feet deep. The Great Lakes once overflowed much of the State, as may be traced by the existing raised beaches.

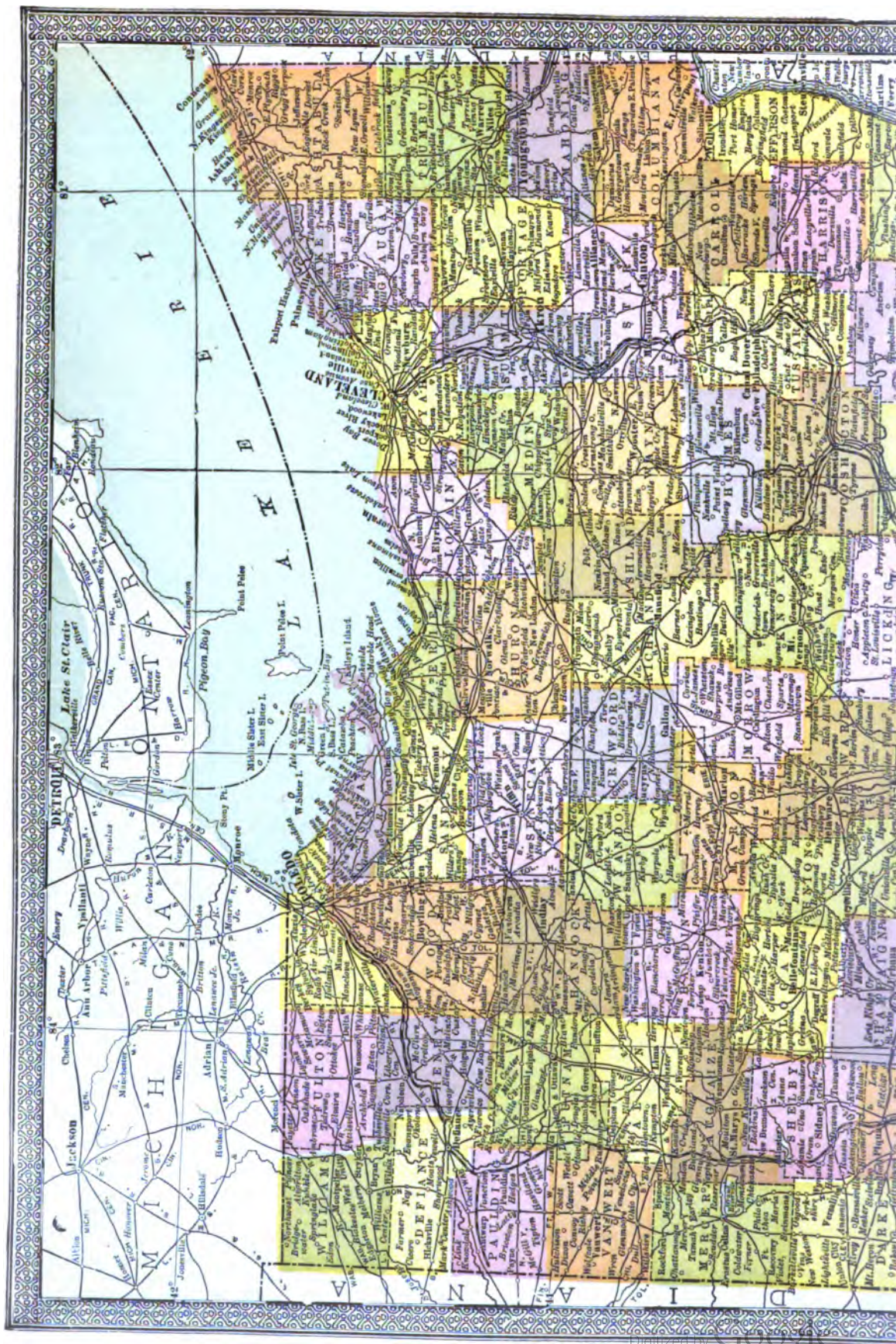
**Minerals and Mining.**—It has been estimated that at the present rate of consumption the State has bituminous coal enough to last 1,000 years. Fire clay of a superior quality forms the interbedding strata of the coal measures. Building stone and the carbonate variety of iron ore are also found here. The salt and gypsum deposits near Sandusky have already been mentioned. Petroleum was discovered in 1884 in the Trenton limestone formation of the Lower Silurian period, and both the Lower and Upper Silurian formations had reservoirs of gas. The coal output of the State was, in 1880, 6,000,000 tons, and, in 1909, 27,939,641, or 7 per cent of the total output of the United States. The number of employees engaged in the coal industry of the State is approximately 47,407. The petroleum industry since 1885 has been most important. There are two distinct petroleum districts:—one, the Lima district, in the northwest, is the more important,—the other, called the Eastern district, is in the southeast. Lubricating oil is obtained in what is called the Mecca-Belden district. There are two gas fields in the State; that in the Eastern district was the first developed in the seventies. The gas was used wastefully and in a few years the supply was almost exhausted. In 1880 the natural gas of the Eastern district used for light and fuel was valued at \$5,000,000; in 1885 the value of the product consumed from the same district was \$100,000. About 1885 the gas fields near Findlay, in the northwest, began to attract attention. Until 1889 the output of the northwest increased annually; then it began to decrease gradually until 1898, since when the annual output has increased. The value of the natural gas product of Ohio in 1909 was \$9,966,938. The Pennsylvania and Indiana outputs, from 1890 to 1900, exceeded that of Ohio, and since 1899 the West Virginia output has also been greater than Ohio.

The annual value of the clay products of Ohio is greater than for any other State in the Union; the State contributes about 17.3 per cent of the total output of the clay products of the United States. The value of the clay products of Ohio, in 1890, was \$10,860,934, and in 1909, \$30,346,241. Of the amount for 1909, \$16,929,855 were for brick and tile and the remainder for pottery. Ohio has a large sandstone product, and in this ranks first in the Union. The value of the sandstone products is about \$1,639,006. The State supplies over three fourths of all the grindstones and whetstones used in the country. The value of the sandstone product at present is not equal to that of some of the early nineties by about \$700,000. The mining of iron ore is not as important an industry as in former years; but Ohio ranks first in the value of carbonated iron ore. Limestone is an important product of Ohio, and large quantities of cement are manufactured each year. There are a number of mineral springs in the State, but the output from only 15 were reported in the last Federal census. The State ranks fourth in the production of salt.

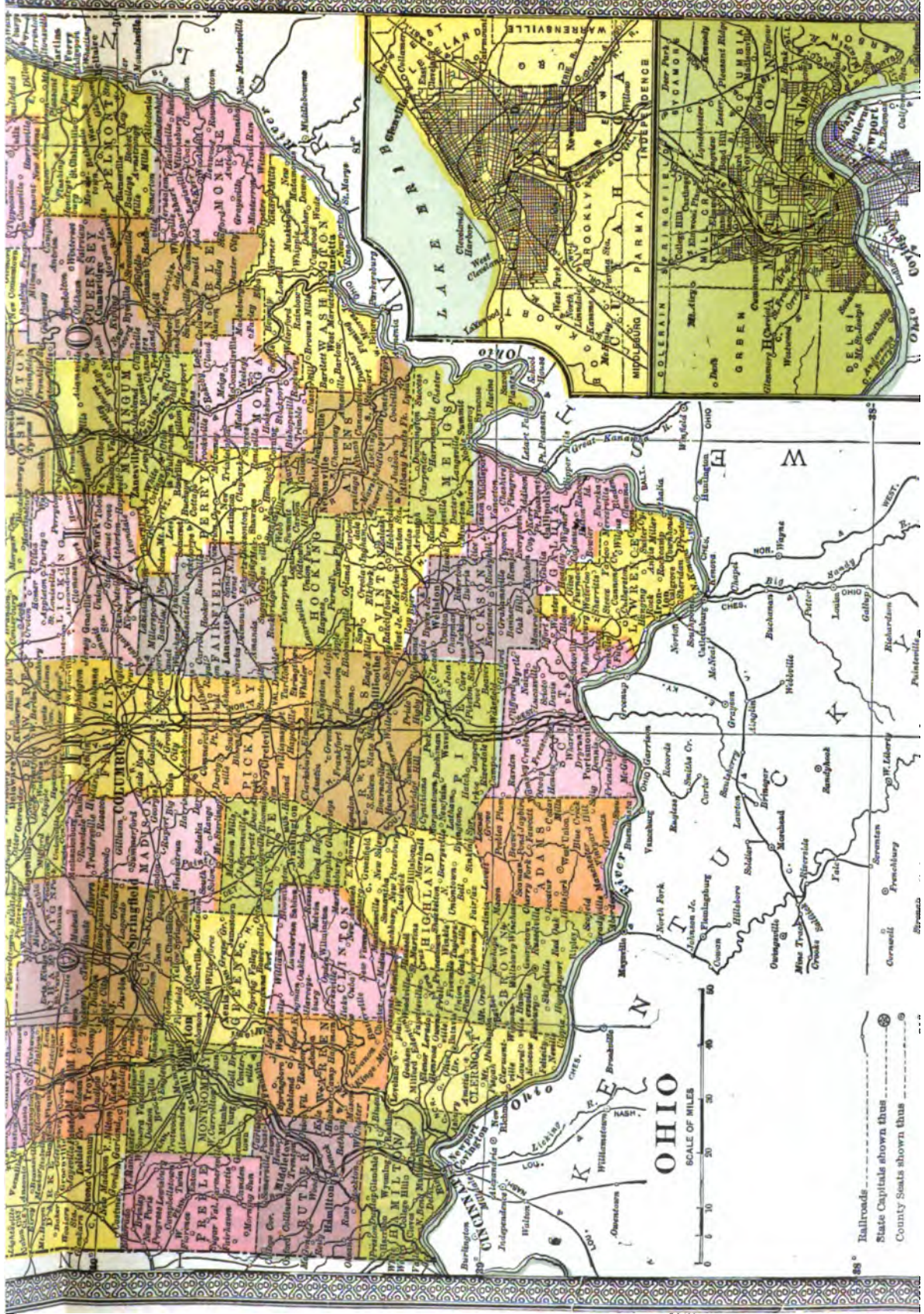
**Climate.**—The climate while temperate is variable, and great extremes occur; but neither excessive heat nor cold is of long duration. The















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maximum temperature is 107.9° and the minimum 34° below zero. The northern part of the State has a longer and colder winter than the southern part; but the winters are not severe in any part of the State. In the northern part, near the Lake, sudden changes of temperature occur, especially during the summer season. The mean temperature for July is 73°, for January 26°. The rainfall is evenly distributed and of an amount generally conducive to the growth of farm products. The annual rainfall averages 39.35 inches. The climate is healthful; the winds which are at times a disturbing element as regards temperature, serve to keep the climate of the State as a whole remarkably healthful.

**Soil.**—The soil of nearly two thirds of the State is the deposit of the drift or quaternary, and nearly all of such soil is fertile. In the southeastern part the soil is composed of the decomposed sub-rock structure. In the northeast the clay soils are found in many counties and in the west there is a large percentage of limestone; along the rivers are alluvial soils.

**Forests and Forest Products.**—The western part of the State was once covered with forests, the hardwood variety of timber, used in building, was abundant. The ash, elm, beech, and varieties of cedar, pine, chestnut, maple, oak, and in some parts walnut were found. In the western part the prairie zone begins. The total extent of forests is about 9,300 square miles, which is 23 per cent of the total area. The wood products of Ohio were noted for their good quality, when the raw material was obtained from the forests of the State. There are over 2,000 lumber and timber manufacturing, and the value of the product for a single year is over \$20,500,000. The value of the lumber and planing mill products, including sash, doors, and blinds, for the year 1908 was \$10,676,293; the value of the furniture products is over \$9,500,000; and of paper and wood pulp, over \$6,500,000.

**Flora.**—See UNITED STATES.

**Fauna.**—See UNITED STATES.

**Agriculture.**—The Federal census reports show 93.9 per cent of land area devoted to farming, and the improved land as 78.5 per cent of the farm area. The waste land has been reduced to a minimum. The large number of manufacturing towns and cities, making a ready market for farm and dairy products, has greatly influenced the agricultural development of the State, and has been one of the chief causes of the increase of improved land acreage from decade to decade since 1850. The average size of the farm in 1890 was 125.2 acres, and in 1900, 88.5 acres. The number of farms occupied and operated by tenants is about 25 per cent of the whole number in the State. There are approximately twice as many farms leased on shares as are rented for cash. Fertilizers are in general use, and are increasing. The cost for fertilizers averages about \$10 per farm.

The agricultural products are varied, some seem to grow well in all parts of the State. The clay soil of the northeast is well adapted to wheat, but wheat is raised in other sections. The leading crops are still corn, wheat, and hay. The corn production (1909) was 153,062,000 bu.; wheat, 23,532,000; hay, 4,033,000. Oats ranked next with a production of 56,225,000. The tobacco production was 83,250,000 lbs.;

potatoes, 16,926,000 bu. Rye, buckwheat, and barley had a combined acreage of 65,000. From 1890 to 1900 the corn acreage had increased 20 per cent, the wheat acreage 41.4 per cent, and tobacco, 61.2 per cent. The potato product is large and of an excellent quality. Other vegetables grown extensively are cabbage, sweet corn, and tomatoes. The State is noted for its extensive orchards. The annual apple crop is near 20,600,000 bushels. Peach, pear, plum, and prune trees have increased greatly in number from decade to decade. Large vineyards are in the region near Lake Erie, and small fruits are cultivated in all parts of the State.

**Stock-raising.**—The receipts from the dairy products are about \$15,500,000 annually. Of this amount \$8,500,000 is from sales of milk. From 1890 to 1900, the amounts derived from the sales of milk had increased 30.3 per cent. The number of dairy cows increased from 794,833 in 1890 to 904,603 in 1909; and other cattle from 968,554 in 1890 to 931,800 in 1909. During the same period there was a decline in the number of horses, mules and asses, and swine. Ohio has led in the number of sheep. In 1890 there were 4,060,729; in 1900, 2,648,250; in 1909, 3,907,055, and the fleeces had increased in weight. The sales from wool, in 1909, amounted to \$5,068,800. Poultry is increasing, especially near the large cities. The laws of the State looking to the prevention of the spread of diseases among stock, are rigidly enforced, as are also the laws relating to purity of dairy products.

**Manufactures.**—According to the latest reports, Ohio ranks first in the United States in the manufacture of carriages, wagons, and supplemental materials, and in pottery and clay products; it is second in the manufacture of agricultural implements of iron and steel, and of food preparations; third in flouring and grist mills products, in the roasting and grinding of coffee and spices, in foundry and machine shop products, distilled liquors, soap and candles, and tobacco, cigars, and cigarettes; fourth in the factory product of boots and shoes, of women's clothing, in the manufacture of glass, of rubber and elastic goods, in refining petroleum, and in cars and general shop construction and repairs by steam railroad companies; and fifth in the factory product of men's clothing, electrical apparatus and supplies, malt liquors, lumber and planing mill products, including sashes, doors, and blinds, in book and job printing and publishing, and in the printing and publishing of newspapers and periodicals. In the value of all manufactures, Ohio ranked fourth among the United States from 1840 to 1880, but in the latter year was surpassed by Illinois, and became fifth, holding that rank ever since. From 10,622 manufacturing establishments with a capital of \$29,019,538 in 1850, Ohio had increased to 20,699 establishments with a capital of \$188,939,614 in 1880, and to 32,398 establishments with a capital of \$605,792,266 in 1900. In 1909, there were 15,138 establishments with a capital of \$1,300,834,000, and products valued at \$1,437,288,000. 508,355 persons were employed in these establishments, who received \$317,638,000 in salaries and wages.

The establishments of 27 leading industries,—including besides those enumerated in the above paragraph, slaughtering and meat packing, the manufacture of furniture, and of paper and wood

pulp,—had increased from 7,997, with a capital of \$268,343,244, and an annual output valued at \$402,134,891 in 1890, to 9,557, with a capital of \$403,595,111, and an annual output valued at \$547,619,814 in 1900. The manufacturing importance of the State is due to its ample natural resources as detailed under *Minerals and Mining*, and *Forests*, and their accessibility by waterways and rail, which led to an early introduction of domestic manufactures along with the chartering of a trading and banking company in 1803. Cleveland and Cincinnati are the chief industrial centres. Cincinnati long held the lead, but has apparently attained its maximum, while Cleveland is still increasing. From 1800 to 1850 Cincinnati was the centre of an extensive hog raising region, and during that period was the most important meat-packing city in the United States; the manufacture of tobacco is also a leading industry of Cincinnati. The manufacture of foundry and machine shop products, including engines, boilers, and machinery of many varieties, is carried on extensively in all the leading cities of the State, but chiefly at Cleveland and Cincinnati. Youngstown, in the Mahoning Valley, is the leading city in the State in the iron and steel industry. Mining machinery is made at Columbus and Akron, machine tools at Hamilton. Pottery is produced at Cincinnati, Akron, Zanesville, Roseville, and East Liverpool, the last town manufacturing over 49 per cent of the white granite ware and semi-vitreous porcelain of the United States. Toledo is one of the granaries of the country with important flouring and grist mills, and Springfield and Canton lead in the manufacture of agricultural implements.

**Commerce and Transportation.**—The foreign commerce of the State carried on through Cleveland, Cincinnati, Toledo, and Sandusky, the four ports of entry of the United States customs districts of the region, is practically unimportant, compared with the enormous domestic commerce over the waterways and the railways of the State. The Ohio River, forming the southern boundary of the State for 436 miles, and its tributary, the Muskingum River, navigable for several miles above Zanesville, have formed for over a century one of the great highways of internal commerce, affording cheap communication with western Pennsylvania and the entire Mississippi Valley; notwithstanding the advent and competition of railroads, their waters still bear the larger freight of coal, lumber, and the heavier articles of transport. Two canals originally connected Lake Erie with the Ohio River, one from Cleveland to Portsmouth, and the other from Toledo to Cincinnati; but at the present time there is no connection with the Lake and river by either, owing to abandonment and decay. Lake Erie and the Erie Canal afford water communication with the Atlantic seaboard; and the northwest States are reached via the western Great Lakes and the Sault Sainte Marie Canal.

The construction of railroads dates from 1832 and the incorporation of the Mad River & Lake Erie railroad, now absorbed in the Big Four system. The railway mileage of the State in 1900, including main line, second line, branches, and side tracks, was over 14,000 miles. The great lines traversing the State are the Baltimore & Ohio, the Lake Shore & Michigan Southern, the Pennsylvania, the Erie, the Cleveland, Cincinnati, Chicago & Saint Louis, and the New

York, Chicago & Saint Louis. The consolidation of the railroads is proceeding gradually, and nearly all the local lines together with the Lake Shore & Michigan Southern and the Baltimore & Ohio are now controlled by larger corporations. The State is provided also with a network of interurban electric railroads connecting almost every populous centre, and ranking first among the United States in the extent of its mileage.

**Banks.**—The first bank of the State was a private institution, which was virtually a private company to which the privilege of doing a banking business had been granted. Five banks were established before 1813, all by special act of the legislature. The first government bank in the State was established in Cincinnati in 1817. This "innovation," as it was called, met with great opposition, and various methods were suggested whereby the United States bank might be suppressed or induced to leave the State. From 1817 to 1836, there were 25 banks established. In 1836 an effort was made to establish a second United States bank, but the legislature passed a special act preventing its establishment. A number of private and unauthorized banks were established between 1840 and 1850. The failure of several of those banks caused losses to many people, and led to the passage of prohibitory laws regarding the establishment of unauthorized banks by the legislature of 1845. The law proved ineffective, and a free banking law was passed in 1851. So much had public opinion changed, that in 1863 nearly all the State banks became National banks. In the panic years of 1873, 1884, and 1893 there were many bank failures in the State, nearly all of which were confined to private and State banks. In 1900, the high prices of United States bonds and other reasons caused a reaction in favor of State banks. From 16 Nov. 1900 to 15 Nov. 1902 inclusive, there were established in the State 42 banks, savings and loan associations. During the same period there were established 20 building and loan associations. In 1909 there were in the State 294 State banks; 12 loan and trust companies; 104 private banks; 350 National banks; and 41 savings banks, making in all 801 authorized banking institutions, with 861,516 depositors, and \$274,281,930.76 savings deposits.

**Finances.**—Prior to 1825, Ohio had no debt. The first State debt was contracted that year, for the construction of canals (see *History*). Later the debt was augmented for other canals, subscriptions toward railroads and roads, and in 1833 the State debt was \$16,880,000, in 6 and 7 per cent bonds. The incomes from canals and a special tax were devoted to the public debt. The State credit remained unimpaired, so that when necessary it was able to borrow further sums. The years 1838-40 brought financial ruin to many enterprises throughout the Union, and made the borrowing of large sums a matter of difficulty. To have discontinued the public works would have caused great loss, so in 1843 the State issued 7 per cent bonds. The canals absorbed the school fund, the sinking fund, and the proceeds from sale of public lands, and by 1856 the debt had been reduced nearly \$3,000,000. A further debt of \$2,423,349 was incurred in 1856, after which the whole was gradually decreased.

In 1880 the State debt was \$6,476,805. In

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SOLDIERS' AND SAILORS' MONUMENT, CLEVELAND.





1903 the remaining portion of the funded debt \$200,000, matured and was paid, together with \$6,000 of interest money. A special university fund was created in 1892. The income of the State is derived from a general tax; about 60 per cent comes from the general property tax, and nearly 18 per cent from the excise tax. The expenses were in 1910, \$12,074,835.44, and revenues, \$11,567,122.77, making an excess of expenditures of \$507,712.67. The assessed value of the real property of the State is \$1,656,944,631, and of the personal property, \$827,370,943; total, \$2,484,315,574. The assessed valuation is 60 per cent of the actual value; and the tax rate \$1.35 per \$1,000. The State as such has no bonded indebtedness. There are general revenue, sinking, school, and university funds.

**Education.**—The Territory of Ohio received its first grant of land for public education in 1785; the Continental Congress reserved for school purposes the sixteenth section in every township. Later grants were made by Virginia, the Western Reserve, and certain Government Military reservations. No common school system was established until 1825; the law was passed the same day as the law providing for the construction of canals (see *Finances*). In 1827 provision was made for selling school lands. Further legislation was enacted from time to time, that of 1873 provided for the classification of school districts, and making obligatory the use of the English language in teaching all branches to be taught in the schools. The German language had been used in many schools. Prior to the establishment of the common school system, there had been founded a number of schools, some private and others by churches or communities. The Ohio University (q.v.) at Athens was founded in 1804 and the Miami University (q.v.) in Oxford in 1809. The legislature of 1901-2 passed a bill, which became a law 12 March 1902, establishing normal schools, for the training of teachers. This law provides for two schools in connection with the Ohio University at Athens and the Miami University at Oxford. These schools are known as State normal schools, they are to be supported by an income from the "Ohio and Miami University Fund," created with the bill. The income is derived from a direct tax. The legislature at the same session passed bills which classify the different grades of schools and provide for examinations for entrance to high schools. The child labor law and the compulsory education laws were rewritten and made to harmonize. Children between the ages of 8 and 14 are compelled to attend school the full time, and children between the ages of 14 and 16, not engaged in some regular employment, are also required to attend; and if the child over 14 and under 16 cannot read and write the English language he must attend the full time. Heavy penalties are provided for the violation of the compulsory education laws. The centralizing of township schools began in Ohio some years ago, when the matter was optional. The first legislation on the subject, in Ohio, was enacted in 1892. The teachers' institutes, teachers' pensions, the school curriculum, all receive wise and almost constant attention. The principal cities have city training classes for persons who intend to become teachers. In 1902 there were in the State 2,437 school districts, 66 of which were city

districts, and 1,335 were township districts, of which latter there were 11,078 subdivisions. The number of children of school age was 1,245,393. The total number of children in public schools, colleges, universities, and public institutions, was 844,728; the number in Roman Catholic parish schools, academies, colleges, and institutions was 74,605, leaving 326,060 children who were in private schools in the State, in schools outside the State, or if between the ages of 16 and 21 they might be in the workshop. The Lutherans have parish schools in nearly all the large cities. In 1909 there were in the State 812 public high schools, 38 private secondary schools, 14 theological schools, 35 colleges and universities, and 47 professional schools including law, medicine, dentistry, and pharmacy. (The colleges and universities appear under their corporate names.)

**Religion.**—The Methodists (by Federal report) have about one fourth of all the church members of the State; and the Presbyterians and Roman Catholics have each about one tenth. The other Protestant denominations, in membership, rank as follows: Lutheran, Baptist, Disciples of Christ, Congregationalists, and Protestant Episcopalians. The Protestants have large and well organized Sunday schools connected with all their churches. The Roman Catholics have Sunday schools also, but where the parish school has been established, the attendance at the Sunday school is usually limited to those not receiving religious instruction during the week.

**Charitable and Penal Institutions.**—The State Board of Charities consists of seven members; six of whom are appointed by the governor, the governor of the State is *ex-officio* a member and is president of the board. A secretary is appointed by the board. The board has the supervision of all State and municipal institutions, including infirmaries, jails and orphanages, or all institutions for furnishing relief or for correction. The State law further provides that this board shall examine, for criticism or approval, all plans for charitable or penal institutional buildings, or changes in buildings. There are 17 State institutions, as follows: State hospitals at Athens, Cleveland, Columbus, Dayton, Longview, Toledo; the Ohio Hospital for Epileptics, Institution for Deaf and Dumb; State School for the Blind, Industrial Home for Girls; Industrial School for Boys; homes at Xenia and Sandusky; a State penitentiary and a State reformatory. The municipal institutions are workhouses at Canton, Cincinnati, Cleveland, Columbus, Dayton, Toledo, Xenia, and Zanesville, and a House of Refuge at Cincinnati. The county institutions are infirmaries, homes, and jails. Outdoor relief is given by infirmaries, doctors, township clerks, and under the direct supervision of the Soldiers' Relief Commission. Changes have been made in the care of epileptics, who are housed in a hospital at Gallipolis. The Juvenile Court, at Cleveland, has shown there are great opportunities for the prevention of the crimes often committed by the young and how they may be reclaimed. The annual State Conference has been productive of much good. Each county has a board of county visitors.

The annual expenses of the State institutions are considerably over \$2,600,000; for the municipal institutions, \$150,000; for the

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county institutions, \$2,127,000, making for the whole a total considerably over \$5,000,000. A National Soldiers' Home is located at Dayton. It has accommodations for 6,000 persons. The Roman Catholic charitable institutions of the State are 14 orphan asylums, having nearly 2,000 inmates; three industrial schools, 450 inmates; 19 hospitals, over 12,000 patients each year; four homes for the aged, about 500 inmates each year; three homes for the friendless, about 200 inmates each year.

**Government.**—The State Constitution now in force was adopted in 1851, and is the second one under which Ohio has been governed. (See *History*.) Provisions for a constitutional convention are arranged for in two ways. "Shall there be a constitutional convention?" is a question submitted to the people at a popular election each twentieth year, and a majority vote in the affirmative is followed by the proposed convention. A constitutional convention may be called at any time if two thirds of the members of each branch of the legislature demand it, and if a majority of all the legal votes cast at a popular election favor it. Amendments may be added as follows: The amendment may originate in either branch of the legislature; it must be approved by three fifths of the members of each House and by a majority of the electors voting at a popular election. If there are several amendments, each one must be voted upon separately. The right to vote implies citizenship, residence in the State for one year, in the county, township, or voting district such a time as may be determined by the general law for the State. Further limitations take into consideration sex, age, and sanity. The right of suffrage may be withdrawn from any person, by the legislature, for certain causes, as bribery, perjury, and other crimes. Voters are obliged to register as required by law, in cities of 9,000 population or over. The State sends to Congress 21 members. The government of the State is administered by the legislature, the executive, and the judicial departments.

**Legislature.**—The Senate and the House of Representatives constitute the legislature. The number of members is based upon the population and is determined by the legislature. Most of the counties have only one member in the lower house, but some of the smaller counties are united with other counties for representation. For Senatorial representation many of the counties are united; but some of the large counties are separate Senatorial districts. A county may be made a separate Senatorial district if it has the population required for a full Senatorial ratio and if a full Senatorial ratio is left in the county or district from which it asks separation. The regular sessions of the legislature are biennial, beginning on the first Monday of January each even-numbered year. The members are chosen by popular vote, for two years, the day of election being the first Tuesday after the first Monday in November. The salaries of members are fixed by law. Bills may originate in either house; each bill can contain but one subject. The lower house impeaches and the Senate tries all impeachment cases; the concurrence of two thirds of the members of the Senate is requisite for a conviction.

**Executive.**—The governor and his subordi-

nates,—lieutenant-governor, secretary of State, State treasurer, and attorney-general, are elected for two years, at the general State election. The auditor is elected for four years; the board of public works and the school commissioner for three years. The governor appoints the superintendent of insurance, commissioner of railroads and telegraphs, State and law librarians, gas commissioner, and supervisor of public printing. He has the power to call extra sessions of the legislature, and the usual veto and pardoning powers. In the absence of the governor, for any cause, the lieutenant-governor, president of the Senate, or speaker of the House are in the line of succession. Ohio has had 45 governors, two of whom were governors of the Northwest Territory (q.v.).

**Judicial.**—The judicial power is vested in the supreme court, circuit courts, courts of common pleas, courts of probate, and justices of the peace. Other courts inferior to the supreme court may be established by the General Assembly. The General Assembly may establish courts of conciliation, and limit their duties and powers, but the judgment of such courts is not final except the parties interested agree to abide by such decision. The judges and justices are chosen by popular vote. The judges of the supreme court are chosen for a term not less than five years, the judges of the common pleas for five years, the justices of the peace for three years.

**Local Government.**—The legislature provides by law, for the organization and powers of cities and incorporated villages, and for the election of county and township officials. The terms of office of county officers do not exceed three years.

**Laws.**—The legal rate of interest is 6 per cent, but 8 per cent may be obtained by contract. Pure-food laws have been passed and are rigidly enforced. Divorces may be obtained for several causes;—wilful absence for three years, extreme cruelty, habitual drunkenness, imprisonment in the penitentiary, adultery, divorce procured by either party in another State, are the chief causes. Restrictions as to time of residence in the State are enforced.

**Militia.**—The number of men of militia age is about 1,000,000. The militia in 1910 consisted of 517 commissioned officers, 5,776 enlisted men, making a total organized militia of 6,293. During the Civil War, Ohio furnished one eighth of the Federal troops.

**Political Divisions.**—There are 88 counties in the State. The Federal census of 1910 gave the population of the nine largest cities as follows: Cleveland, 560,663; Cincinnati, 364,463; Toledo, 168,497; Columbus, 181,548; Dayton, 116,577; Youngstown, 79,066; Akron, 69,067; Springfield, 46,921; Canton, 50,217. Columbus is the capital of the State.

**History.**—Numerous evidences of prehistoric Ohioan inhabitants are found in the mounds existing in different parts of the State. The study of any one of these mounds, especially of the type of the fort in Adams County, shows the degree of advancement of the people now called the Moundbuilders (q.v.). The first appearance of Ohio in history is when Robert Cavalier de LaSalle left his home at LaChine, near Montreal, Canada, in 1669, on a journey of adventure, before his return he discovered the Ohio River and ascended on its waters near

where Louisville now stands. When LaSalle later vested in France the title of the Mississippi Valley by discovery in 1682, the area of what is now known as Ohio became a French possession and remained such until the Treaty of Paris in 1763 when it became territory of Great Britain.

The first English-speaking settlement made in Ohio was established at the mouth of Laramie's Creek on the Great Miami River in what is now Shelby County. This settlement was made in 1749 and was called Pickawillany. In June, 1752, the French, with their Indian allies, the Chippewas and Ottawas, massacred these white settlers and wiped out the first English settlement in what is now Ohio. In 1748 some English and Virginian gentlemen organized what was known as the "Ohio Land Company," for the purpose of settling the newly discovered Ohio Valley. Their settlements aroused the intense antagonism and jealousy of the French, and the result was an attempt on the part of the French to stop these intrusions into her territory, and England to persist in continuing them. In 1753 The Ohio Company complained to Governor Dinwiddie of the interference by the French authorities, and the governor sent George Washington, a young man of 23, to endeavor to terminate the friction by peaceable negotiations. He was unsuccessful, however, and the conflict continued until finally peace came from the treaty of Paris, signed 18 Feb. 1763, by the terms of which the vast territory of which Ohio was a part became the possession of Great Britain. After ten years of peace the murder of nine kinsmen of the Iroquois chief Logan by a borderer named Greathouse, caused an uprising of the Indians, and in 1774 a campaign against them was inaugurated by Governor Dunmore of Virginia, which is known in history as Lord Dunmore's war. It was in this campaign, in the heart of the Indian country along the Scioto River, that the celebrated speech of Logan, the Mingo chief, was delivered.

When the war for independence came on, the Continental Congress, regarding the Northwest Territory as a good heritage to preserve for American supremacy, fortified various points in what is now known as Ohio, the earliest of which was Fort Laurens, the first military stockade erected by American authority in Ohio. This fort was abandoned in 1779. In 1780 and the five years following, Ohio was the theatre of active warfare against the Indians and under the leadership of Col. John Bauman, of Kentucky, the Indians were attacked on the Little Miami River in what is now Greene County, and by Col. George Rogers Clark at other points contiguous. In this period occurred various scenes indicative of the terrible condition of feeling existing between the Indians and whites. There were massacres on both sides characterized by brutality and savagery. The year 1782 opened with a number of atrocious deeds of violence by the Indians. Innocent women and children were murdered in the most horrible manner. The whites were exasperated, and in February of this year Col. Williamson led an expedition against the Indians. They marched into the Tuscarawas country in eastern central Ohio and massacred in cold blood and with brutal vengeance the Moravian Indians, a peaceable and Christian tribe that had never raised their hands against the whites nor participated in any of the troubles

between the Americans and English. Later in May of the same year Col. Wm. Crawford marched 500 men through the Ohio country from where Steubenville now stands to the Wyandot country on the Sandusky River, near where Upper Sandusky is now located. His attack resulted in defeat with a loss of over 100 of his men and the capture of Col. Crawford himself. Col. Crawford was burned at the stake by the Delaware Indians in retaliation for the murder of some of their tribe by Col. Williamson's men.

These Indian campaigns and wars, up to 1782, while they were the outgrowth of adventure upon the part of the Pennsylvanians and Virginians, were sanctioned by the Continental Congress and by the various colonial governments.

When peace came through the treaty of Paris, which was signed 3 Sept. 1783, all the territory east of the Mississippi River was relinquished to the United States by Great Britain. A part of this acquisition was what was known as the Northwest Territory (q.v.), which added 240,000 square miles to the United States. In October, 1787, the Federal Government sent 700 troops to the frontier to protect this territory and to emphasize to the Indians that the white man's government had commenced. On 5 October Congress elected officers for the new government. Arthur Saint Clair was named as governor and with him were designated James M. Varnum, Samuel Holden Parsons and John Armstrong, as judges and Winthrop Sargent as secretary of the territory. Mr. Armstrong declined to serve as judge and John Cleve Symmes was named to fill the vacancy. On 9 July 1788, Governor Saint Clair and his associate officers arrived at Fort Harmer where they remained until the 15th when they entered Marietta as the representatives of the National Government.

The first settlement in the Northwest Territory was effected under the control and direction of Gen. Rufus Putnam, who had formed "The Ohio Company of Associates" (q.v.) in Boston on 1 March 1786. Gen. Putnam with his little band of emigrants journeyed from Connecticut to the banks of the Ohio in the winter of 1787-8, and on 7 April they landed in the rain at the mouth of the Muskingum River and founded Marietta (q.v.).

Governor Saint Clair, as before stated, inaugurated the reign of law, and on 2 September the first court ever held on Ohio territory was opened with formal ceremonies at Marietta. The second settlement in Ohio was made at Columbia, about five miles above Cincinnati. Major Benj. Stites of Pennsylvania purchased 10,000 acres from Judge Symmes near the mouth of the Little Miami. On 18 Nov. 1788, 26 hardy Pennsylvanians located at this point, erected a block house, laid off a little town and called it Columbia. While the major was laying off the town of Columbia, Mathias Denman, with Robert Patterson and Israel Ludlow laid off a town on the high north bank of the Ohio River and opposite the mouth of the Licking River. About 28 Dec. 1788, Denman and his companions, 15 in number, landed at this site and founded the city of Cincinnati (q.v.).

In February, 1789, North Bend, near the Indiana line, was settled by Judge Symmes and his associates. For the protection of the three

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settlements at Cincinnati, Columbia and North Bend, Fort Washington was constructed at Cincinnati which was then the principal centre of the Miami country. On 2 Jan. 1790, Governor Saint Clair arrived at Fort Washington and issued his proclamation establishing Hamilton County. The county-seat was fixed at Cincinnati. This was the beginning of the great State of Ohio. It absorbed the population of North Bend and Columbia, and in 1795 its population were soldiers.

The next settlement in point of time was at Gallipolis. October 1790, 400 French emigrants settled at this place and in memory of their native land called it Gallipolis. They were induced to make settlement here by the picturesque and highly colored representations made to the French people by Joel Barlow who went to France in 1788 to represent the Scioto Company (q.v.), for the purpose of putting its lands upon the market. The settlers were unqualified and untrained for the hardship of pioneer life, and this fact, in addition to the one that the title to the lands was defective, broke up the settlement. Many of them drifted further west to Detroit and Kaskaskia, and some remained and purchased their land from the Ohio Company. Congress, in 1795, sympathetically granted 24,000 acres of land to these defrauded emigrants. This land is in the eastern part of Scioto County on the Ohio River and is known, by reason of its history, as the "French Grant."

At Manchester, on the Ohio River, in 1791, Col. Nathaniel Massie made the first settlement in the Virginia Military District. This composed the territory between the Scioto and Little Miami which had been reserved in the deed of cession by Virginia for bounty land for her soldiers.

In 1796 Col. Massie, assisted by Duncan McArthur, laid out and founded the town of Chillicothe. The opening to emigration of the far-famed land of the Shawnees attracted many settlers from Virginia, and Chillicothe in a short time became an important and populous town.

The settlements referred to thus far were in the southern and central portions of the State, and it was not until 1796 that emigration commenced to develop in the northern part. Gen. Moses Cleaveland, as agent for the Connecticut Land Company, with 52 Connecticut settlers, on 4 July 1796, landed at the mouth of Conneaut Creek, in Ashtabula County, for the purpose of settling the Western Reserve. In addition to being settlers, many of them were surveyors. On 26 July 1796, Cleaveland and his associates proceeded to the mouth of the Cuyahoga River and laid out the chief settlement of the Western Reserve. It was named Cleveland, in honor of the leader of the expedition.

The pioneers of the Western Reserve that settled at these points suffered many privations and the country did not grow as rapidly as those further south, and in 1798 there were but 130 persons in the whole Reserve.

Ohio now commenced to grow with considerable rapidity and settlements sprung up and developed in every quarter. In 1799 there were in existence and enjoying peace and prosperity the towns of Marietta, Columbia, Cincinnati, North Bend, Gallipolis, Manchester, Hamilton, Dayton, Franklin, Chillicothe, Cleveland, Franklinton, Steubenville, Williamsburg, and

Zanesville. Their prosperity and safety was accomplished through much tribulation and danger, for during the period of their development the territory had passed through its second war with the Indians, to which a retrospect is necessary.

Notwithstanding that on 9 Jan. 1789, at Fort Harmer, Governor Saint Clair made a treaty with the Six Nations and the Representatives of the Wyandots, Delawares, Chippewas, Ottawas, Pottawatomies and Sacs, he failed to secure the good-will of the Indians. Marauding parties and forays on the part of the savages continued to be projected against the whites, evidently instigated by the English. Accordingly, in September 1790, Saint Clair, with a little army, gathered from Pennsylvania, Virginia and Kentucky, amounting to about 1,400, of which 300 were regulars, marched against the Indians. He was overwhelmingly defeated. Owing to a failure to control the militia and lack of general discipline the battle resulted in a rout. After the defeat of Saint Clair, General Anthony Wayne, one of the most daring officers of the Revolution, was placed in charge of a campaign against the Indians and spent the spring and summer of 1793 at Fort Washington in Cincinnati, drilling and recruiting his men. In October 1793 he left Fort Washington with an army of 3,000 well-equipped soldiers and proceeded to six miles beyond Fort Jefferson, where he erected Fort Greenville, near where Greenville, Darke County, is now situated. He spent the entire season here and in the spring of 1794, after making many efforts to enter into a treaty of peace, he attacked them on 20 August, defeating them with great slaughter. Nine of the Wyandot chiefs were killed and the Indian question was solved forever in Ohio. This engagement was known as the battle of Fallen Timbers, on account of the breastworks of fallen trees behind which the Indians were massed. The result of this campaign was a treaty of peace which was known as the Treaty of Greenville, which was signed by the chiefs of the 12 hostile tribes at Fort Greenville, 3 Aug. 1795. By the terms of this treaty the Indians released extensive territory between the Lakes and the Ohio River and the United States gave them \$20,000 in merchandise and \$9,000 annually, to be divided among the several tribes. This was the last Indian warfare in Ohio.

With peace the population of the territory began to increase. In 1790 there were about 3,000 white inhabitants in Ohio; five years later there were 15,000 white persons in the Northwest Territory, and by 1798 there were 5,000 free male persons of full age within its boundaries, and under the Ordinance of 1787 this entitled the people to a territorial legislature. Accordingly on 29 Oct. 1798, Governor Saint Clair issued his proclamation fixing the day for electing territorial representatives on the third Monday of December following. Thus the Territory of the Northwest passed into its second or legislative grade of government.

During the years preceding this change, barring the Indian troubles, the settlers were progressing satisfactorily. Religion and literature were planted in Ohio. The first church in the territory was erected in 1790 at Columbia, and on 9 Nov. 1793 the first newspaper was printed by William Maxwell of Cincinnati, under the

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name of 'The Sentinel of the Northwest Territory.'

The first territorial legislature met at Cincinnati 4 Feb. 1799. Edward Tiffin of Ross County was elected Speaker of the first General Assembly of the Northwest Territory, and Henry Vanderburgh President of the Council. William Henry Harrison, afterward President of the United States, was elected the first delegate to Congress from the territory. A bitter conflict between the governor and the legislature commenced at this time. Saint Clair was a Federalist and he was opposed by the followers of Mr. Jefferson in the territory. At this time the vast Territory of the Northwest was divided into two districts—the dividing line ran from the mouth of the Kentucky River to Fort Recovery, and northwest to the boundary line between Canada and the United States. West of this line was erected the Territory of Indiana, of which Mr. Harrison was appointed governor, and east of the line was the Territory of the Northwest, of which Chillicothe was designated the seat of government. On 19 Dec. 1799, Governor Saint Clair, exercising the power vested in him by the Ordinance of 1787, dissolved the territorial legislature and fixed the first Monday in November 1800, as the date of its next session.

The second session of the territorial legislature met at Chillicothe on 3 November, and after being in session five weeks adjourned on 9 December. William Henry Harrison having resigned his position in Congress, William McMillan of Cincinnati was elected to fill the vacancy and Paul Fearing of Marietta to serve the succeeding term. At this time Ohio had a population of 42,000. Transportation and trade were increasing on all hands. On the Ohio River there were packets running regularly for mail and traffic between Cincinnati and Pittsburg, making the round trip in about four weeks. The first vessel of any size or importance was the brig Saint Clair, built at Marietta, of 110 tons burden. It was loaded with provisions, sailing down the Ohio, Mississippi and across the Gulf of Mexico and finally landed safely in Philadelphia. Transportation by land was by the heavy and cumbrous trading wagons drawn by four and six horses. Cincinnati was a great distributing point for the southern and central part of the territory.

The iron used in the territory came from Pittsburg and Baltimore, and when from the latter cost \$200 a ton for transportation to the interior of Ohio. The southern and central parts got their supply of salt from the "Ohio Salt Works," located in what is Jackson County of to-day. It sold at the works for two and three dollars a barrel, and after the journey homeward of 100 miles the purchaser sold it to his neighbors for seven dollars a barrel. These were some of the general conditions of the people in what is now Ohio in 1800. There were no vehicles except for burden in the territory. Marietta was the stronghold of Federalism and Chillicothe was the seat of Republicanism, and there were bitter conflicts between the followers of Alexander Hamilton and Thomas Jefferson. Cincinnati was divided almost equally in politics.

The third territorial legislature commenced on 24 Nov. 1801. At this session Cincinnati and Chillicothe were incorporated and the seat of

government changed from the latter town to the former.

On 3 April 1802, Congress passed an act enabling the people of Ohio to form a constitution and State government. This was the result of a persistent controversy between the followers of Jefferson and the Federalists. In pursuance to that law of Congress the constitutional convention met at Chillicothe 1 Nov. 1802 and adopted a constitution for the State. It was never submitted to the people. The intense feeling against Saint Clair on account of his vetoes eliminated the veto power from the governor. The convention fixed the capital at Chillicothe until 1808, and named the boundaries of the State. On 19 Feb. 1803, Congress of the United States extended the jurisdiction of the Federal courts over Ohio.

On the second Tuesday of January 1803, the election for governor was held. Edward Tiffin, the candidate of the anti-Federalists, was elected. On Tuesday, 1 March 1803, the first legislature met at the State capitol at Chillicothe. Nathaniel Massie was elected Speaker of the Senate and Michael Baldwin Speaker of the House. Officers provided under the constitution were appointed as follows: Secretary, William Creighton, Jr.; Auditor of State, Thomas Gibson; Treasurer of State, William McFarland; Judges of the Supreme Court, Return J. Meigs, Jr., Samuel Huntington, and William Spriggs. At this session Thomas Worthington and John Smith were elected United States Senators from Ohio.

In 1805 Aaron Burr (q.v.), the ex-Vice-President, visited the west and spent considerable time in Ohio, accumulating boats, provisions and accoutrements for the carrying out of his treasonable designs, which were frustrated through the activity of Governor Tiffin. For this act Tiffin received the thanks of the President of the United States. On the ground of being suspected as an accomplice of Burr, John Smith, one of the senators from Ohio to the United States Senate, was charged with treason, and after a complete investigation by the Senate a motion was made to expel him, 9 April 1808, but failed for want of the requisite two thirds vote. He resigned, however, at the request of the General Assembly of Ohio, and Return J. Meigs, Jr., was elected in his stead.

The first seven years of Ohio's estate was a period of marvelous advancement. The population in 1810 was 230,760, an increase of more than 400 per cent over that of 1800. The immigration was healthy and valuable. New New counties were erected and out of the wilderness came wealth, so that in 1810 the taxable property of Ohio was valued at \$25,000,000. The natural resources of the State became known and developed. The first blast-furnace was operated in Mahoning County; coal was first mined in 1810 in Summit County.

Education advanced materially (see paragraph on Education). By 1810 there were fourteen newspapers in Ohio, representing the two contending parties of the day. The populations of the towns throughout Ohio continued to increase. Cincinnati ranked first in importance and in size. Its population had increased to 2,540. On the whole, Ohio was occupying a positive and prominent position in the Union.

The first steamboat to navigate the Ohio



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River was launched at Pittsburg and called the New Orleans. It descended to Louisville and continued to make trips between that place and Cincinnati. With this event began a new era in the business development of the Ohio, and the value of the Ohio River as a channel of transportation became more apparent than ever to the people of the new State. In 1810 as a result of political feeling in the legislature, the seat of government was transferred from Chillicothe to Zanesville.

On 14 Feb. 1812, the legislature changed the seat of government from Zanesville to Chillicothe, but at the same time provided for the permanent establishment of the capital at Columbus.

In the second war with England, which was finally declared by the United States 18 June 1812, Ohio played an important and patriotic part. She furnished regiments to Gen. Hull at Detroit and resented his cowardly surrender. Under Gen. William Henry Harrison the soldiers of Ohio were chief in his movements in the northwest in the war against England. Governor Meigs in the meantime calling out, as necessity required, the quota of men assessed upon Ohio. At Fort Meigs, at Fort Stephenson and at other points throughout the State there were conflicts with the British, and at Lake Erie, through Oliver H. Perry, a young sea-captain from Rhode Island, the English supremacy upon the northern lakes and upon the line of the northwestern boundary was destroyed forever. The battle of Lake Erie was the last engagement of the War of 1812 that occurred within the territorial limits of Ohio. To the expense of this war Ohio contributed over \$300,000. Governor Meigs, on account of his patriotic services to the country, was made postmaster-general in President Madison's cabinet.

The General Assembly met for the first time in Columbus on 2 Dec. 1816, and it has assembled there ever since. In this year the State Library was founded by Governor Worthington and from a few volumes gathered by him it has grown to be a fine collection of more than 100,000 volumes.

The second United States bank, when re-chartered in 1816, opened branches in Ohio at Cincinnati and Chillicothe. This was the occasion for a long and severe contest between the officials of the State of Ohio and the United States government over the right of the former to tax branches of the United States Bank. The General Assembly passed a law taxing each bank \$50,000 and authorized the State government to collect it by force. After a long litigation it was ended in 1824 by the Supreme Court of the United States declaring the Ohio law taxing banks unconstitutional. The controversy was carried on largely by the advocates of the State banks on one hand and the opponents on the other.

In 1825 the State of Ohio commenced the construction of her canal system. The work was formally commenced 4 July 1825. Governor DeWitt Clinton of New York and Governor Jeremiah Morrow of Ohio initiated the labor of breaking the ground. After ten years all that energy, men and money could do was directed to the canals. The Federal government aided and encouraged the construction by the donation of 1,100,351 acres of land. This land was sold and the proceeds, about \$2,200,000, were used

for the construction of the canals. At the same time of the inauguration of the canal system the public school system was developed. By the association of the friends of internal improvement and popular education both of the great movements were accomplished.

Lafayette visited Ohio in 1825 and was made the formal guest of the State for days, amid the thundering of cannon and the acclamation of a grateful people.

Commencing in 1831 Mormonism flourished several years in Ohio. Joseph Smith with his followers settled in Kirtland, Lake County, in 1832. They built a building here in 1835 which was dedicated on 27 March 1837, in a ceremony witnessed by thousands of people. The Mormon Church grew in numbers, wealth and power for five years in this State; but it finally, under the condemnation of public opinion and the enforcement of the law, crumbled away until its leaders and people, in 1838, fled from the State to beyond the Missouri River.

What is known in Ohio history as the "Toledo War," culminated in 1835. It was a dispute between Ohio and Michigan over the boundary line between these two States. There was involved in this controversy a strip of land the whole length of the northern Ohio boundary, five miles in width at the west end and over eight miles at the east end. It was rich agricultural land, but its chief charm was the harbor where Toledo now stands. Both sides, through their governor and legislative bodies, asserted their respective jurisdictions over the mooted territory. So strong was the determination of each State to secure possession of the strip of territory which each claimed that the militia of both States were called out for a time and conflict was imminent. On 31 March Governor Lucas with his staff and 600 of the militia of Ohio appeared at the debated boundary line. In the meantime Governor Mason, with 1,000 men, arrived at Toledo, and there encamped fully determined to assert the jurisdiction of Michigan. In the meantime, however, two peace commissioners from the President of the United States arrived on the scene. The dispute was finally terminated on 29 Aug. 1835, by the removal of Governor Mason from his position as governor of the territory of Michigan. Congress, at its next session in June 1836, decided in favor of Ohio. As compensation for the loss of this fertile strip of land Michigan was given the large and fertile peninsula between Lakes Huron, Michigan and Superior. Ohio thus settled her northern boundary and Michigan was given one of the richest beds of mineral ore in the world.

On 4 July 1839, the cornerstone of the present State house was laid in the presence of many citizens. The occasion was made one of public display and demonstration. Ex-Governor Jeremiah Morrow delivered the address and laid the cornerstone.

The census of 1840 found Ohio the third State in point of population, having 1,519,467 inhabitants; being an increase of 63 per cent over the population of 1830. At this time nearly one third of the population was employed in manufacture and trade. Cities, while increasing in number, were still small in size. Cincinnati had 46,338 inhabitants; while Cleveland was a town of 6,000 and Columbus the same. In this

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decade the railroad system of Ohio was commenced.

In common with the rest of the country, Ohio was much agitated by the nomination and election to the presidency of Gen. William Henry Harrison in 1840. This was the first impression in a political way that Ohio made upon the country. Up to this time the State had but little influence at Washington. But the nomination of her citizen, General Harrison, at once made Ohio the battlefield of the contest. Great meetings, never equaled up to this time, were frequent in the State. General Harrison's march through Ohio was one triumphal procession of oratory, display and song. At Dayton a political meeting, addressed by General Harrison, numbered 80,000. At Chillicothe he spoke to 50,000 people. Political meetings at this time lasted for several days, just according to the number of orators. The "Log Cabin" campaign resulted not only in the election of General William Henry Harrison to be President of the United States, but also Hon. Thos. Corwin was elected governor of Ohio.

In 1846 Ohio was again called to play an important part in the military affairs of the Union. War with Mexico was declared 13 May 1846, and Ohio sent out four regiments of volunteers and three independent companies. The total number of men furnished was 5,536; more than any other northern State.

In August 1846 the introduction of raw coal as furnace fuel in lieu of charcoal, for iron-smelting, was an industrial event the effect of which on the wealth and growth of the State cannot be justly estimated. It gave a fresh impetus to iron manufacturing and allayed the painful doubt about its reliability, raised by the diminution of the timber supply for the charcoal blast furnaces.

In February 1850, an act calling a second constitutional convention was passed. Nearly 50 years had passed since the forming of the first constitution and in the stupendous development of the State it was generally admitted that the instrument needed change and revision. After a session of 135 days the convention adjourned, and on the third Tuesday of June 1851, the constitution was submitted to the people and it was adopted by a pronounced majority.

The last vestige of what is known as the "black laws," that is, laws that discriminated against the negro in Ohio by preventing him being a witness in court if a white man was party to the case, and by preventing his settlement in Ohio without giving bond and by imposing other restrictions, both unjust and unjustifiable, were repealed in 1849. Anti-slavery sentiment was strong in Ohio and the legislature of this period was known as the "anti-slavery legislature." Out of the public discussion of those days grew the Republican party, which held its first State convention in the State of Ohio in Columbus, 13 July 1855. In the election which followed Salmon P. Chase was elected governor, and on 14 Jan. 1856 commenced his gubernatorial term. Governor Chase's administration was signalized by the reorganization of the militia of the State. During this period the State was noted for its "Underground Railroad" (q.v.).

With the approach of the Civil War and in that crisis Ohio met every patriotic demand

made upon her. When President Lincoln issued a proclamation, 15 April 1861, calling for 75,000 of the militia of the several States of the United States, the response was immediate from Ohio. Within 24 hours after the President's call 20 companies had proffered their services. Within 36 hours they were on their way to Columbus, where they were organized, 18 April, into the First and Second regiments of Ohio volunteers. The next day they started for Washington city. All this preparation was actively sustained by the legislature. On the day after the call to arms the Senate passed a million-dollar appropriation bill for war purposes exclusively. Within three days it passed the House unanimously. The late President Garfield was at that time a member of the Ohio Senate and took advanced ground in sustaining the Federal government. In the summer of 1863 the State of Ohio was subjected to the attacks of Gen. John Morgan, a daring Confederate raider, who entered the southern part of the State near Cincinnati and passed through southern Ohio; but after inflicting considerable damage, was eventually captured at Salineville, Ohio, 26 July 1863. Morgan's raid cost the people of Ohio \$897,000.

The history of Ohio in these later days has been one of unbroken progress and prosperity. No stirring events have entered into her records save the marvelous developments of her people.

For the third time, 14 May 1873, a constitutional convention assembled to prepare and present to the citizens of Ohio a new organic instrument of law; but they were satisfied with the constitution of 1851 and they rejected, on 18 Aug. 1874, the proposed constitution by a majority against it of 147,284.

Of the Presidents since 1876 four, Rutherford B. Hayes, James A. Garfield, William McKinley and Benjamin Harrison were native Ohioans.

In the growth of population of Ohio she maintained her position as third State in the Union for 50 years, from 1840 to 1890; when she became the fourth in rank, having been outgrown by Illinois; but, notwithstanding, the percentage of increase for as old a State has been marvelous. From 1820 to 1850 the development of population was over 700 per cent, and it was more than doubled from 1850 to 1900. The population during the last four decades was (1880) 3,198,062; (1890) 3,672,316; (1900) 4,157,545; (1910) 4,767,121.

*Bibliography.*—Black, 'Story of Ohio'; Clark, 'Picturesque Ohio'; Clarke, 'Antiquities of Ohio' and 'Founders of Ohio'; Clappole, 'Lake Age in Ohio'; De Nadaillac, 'Prehistoric Americans'; Force, 'Early Notices of Indians of Ohio'; Hinsdale, 'The Old Northwest'; Howe, 'Historical Collections of Ohio'; Howells, 'Recollections of Life in Ohio'; McCabe, 'Historic Towns of Ohio'; Maclean, 'Mound-builders'; Moorehead, 'Primitive Man in Ohio'; Reid, 'Ohio in the War'; Ryan, 'History of Ohio'; Short, 'Ohio: a Sketch of Industrial Progress'; Siebert, 'Government of Ohio'; Thompson, 'Bibliography of Ohio'; Venable, 'Footprints of Pioneers in Ohio' and 'Beginnings of Literary Culture in Ohio,' 'Ohio Statistics,' and other State official publications; 'Bulletin of Twelfth Census'; Publications of Ohio Archaeological and Historical Society.

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## OHIO—OHIO STATE UNIVERSITY.

**Ohio**, one of the largest tributaries of the Mississippi River. It is formed by the junction of the Allegheny (q.v.) and Monongahela (q.v.) rivers, at Pittsburg, in the western part of Pennsylvania. The Allegheny River brings to the Ohio the waters of Chautauqua Lake, and the drainage waters from the southwestern part of the State of New York. The headwaters of the Allegheny in New York are only a few miles from Lake Erie. It is navigable 120 miles from the Ohio. The headwaters of the Monongahela have their rise in the Alleghany Mountains in West Virginia, near the source of the Potomac River. It is navigable for about 60 miles from the Ohio. The Allegheny and Monongahela are large rivers at Pittsburg, where they blend their waters to make the new stream. Here the Ohio is 1,021 feet above sea-level, and at its confluence with the Mississippi it is 322 feet above the sea. At first the Ohio flows north by west, the valley broadening out to a flood plain. At Beaver the river turns and flows south by west, then almost south, forming the boundary between Ohio and West Virginia; changing its course west, northwest, southwest, forming the boundary between Ohio and Kentucky, then forming the boundary between Kentucky on the south and Indiana and Illinois on the north. Along its course are a number of large curves, but it has no falls nor rapids that obstruct navigation except at Louisville (q.v.), where a coral reef is found, but the rapids formed have been overcome by lateral canals. The descent here is about 22 feet in two miles. The river is now navigable for its whole course, a distance about 975 miles; but a direct line from Pittsburg to the mouth of the river is about 614 miles. The area of the Ohio basin is about 214,000 square miles. The average rate of flow is a little over three miles an hour. The chief tributaries are the Muskingum, Scioto, and Miami in Ohio, and the Wabash, which is the largest affluent from the north. The largest tributaries from the south are the Tennessee and the Cumberland; other large streams are the Kanawha, Licking, and Kentucky. The largest tributaries of the Ohio have their headwaters in the mountains, and thus they become the depositories of vast quantities of the melted snows and heavy rains of spring which cause floods in the Ohio Valley. Often great damage to property and even loss of life is caused by these floods. There are times in the dry season when the water is so low at Pittsburg and in places below, even as far as Cincinnati, that navigation is hindered or retarded. The Ohio and its tributaries have 2,300 miles of navigable waters. The coal from Pennsylvania, West Virginia, and Ohio, the building stone, and the grain and other farm products, the iron, steel, clay, and lumber products, make a large amount of freight which is carried over the Ohio and its tributaries. The average annual amount of freight is 15,000,000 tons. There are a number of large cities on the banks of the Ohio, some of which are Cincinnati, Louisville, and Evansville.

The Ohio River has been prominent in the history of the United States. From the first it was recognized as one of the important waterways of the country. The short portages from Lake Erie to the navigable tributaries of the Ohio, and the continuous waterway to the Gulf of Mexico, made the river an important route for the explorer, missionary, and settler. See

*UNITED STATES, History; NORTHWEST TERRITORY; OHIO.* Consult: Bliss, 'Dr. Saugrain's Relation of his Voyage Down the Ohio River,' in 'American Antiquarian Society Proceedings' (Worcester, 1897); King, 'History of Ohio.'

**Ohio, Army of the**, in American military history, a division of the Federal army in the Civil War; organized in 1861-2 by General Buell; afterward under the command of General Rosecrans and incorporated with the Army of the Cumberland. A second department of the Ohio was formed, and was also in 1865 incorporated in the Army of the Cumberland.

**Ohio Company, The**, in American history, a western colonial enterprise known as the Ohio Company the first and Ohio Company the second. (1) In 1749 George II. granted to a party of wealthy Virginians a tract of land containing 500,000 acres, lying mostly to the west of the mountains and south of the Ohio River. Thomas Lee was the projector of this company, but it was later conducted by Lawrence Washington. The conditions of the grant were that 100 families should be established there and a garrison maintained. It was short-lived. (2) On 3 March 1786 at the suggestion and in the house of Rufus Putnam (q.v.), of Rutland, Mass., Putnam, Cutler, Brooks, Sargent and Cushing organized an association of 1,000 shares, each of \$1,000 in Continental certificates, or \$125 in gold. A year was allowed for subscription. Land was to be purchased from Congress, in tracts lying between the Ohio and Lake Erie. On 9 May 1787 Parsons, agent for the company, appeared before Congress and was well received. Congress granted certain lots free of charge, and an enormous tract was bought at about eight or nine cents per acre in specie. Colonization was immediately begun, and slavery was prohibited. The company had much influence in shaping the ordinance for the government of the Northwest Territory. See ORDINANCE OF 1787.

**Ohio State Archaeological and Historical Society** was first organized at Mansfield, Ohio, in 1875 as the Archaeological Society of Ohio. Subsequently it was reorganized at Columbus and incorporated March 1885 as the Ohio State Archaeological and Historical Society. Its first president was Hon. Allen G. Thurman. E. O. Randall of Columbus has been its secretary since 1893. The headquarters are at Columbus. It has a library and very extensive archaeological museum in Page Hall, Ohio State University. It is managed by a board of trustees, part of whom are appointed by the governor and part elected by the members of the society at their annual election. The society is supported with appropriations by the General Assembly of the State. It publishes an annual volume of biographical, historical and archaeological matter pertaining to Ohio. It has published some fourteen volumes. It conducts archaeological researches each summer amid the sites and remains of the prehistoric mound builders. Prof. W. C. Mills is the curator. It has some 300 members, divided into three classes, namely, honorary, life and ordinary.

**Ohio State University**, opened at Columbus in 1873. In 1866 an act passed the Ohio legislature providing for the establishment of the Ohio Agricultural and Mechanical College, in accordance with the provisions of the Federal

land grant of 1862. But nothing further was done until 1870, when a second law was passed by which the college was established at Columbus. It was reorganized in 1878 and the name changed to Ohio State University. The present organization includes six colleges: (1) the College of Agriculture and Domestic Science, offering courses in agriculture, horticulture and forestry, and domestic science; (2) the College of Arts, Philosophy and Science, which confers the three degrees, A.B., B.S., and Ph.B.; (3) the College of Engineering, offering courses in civil, mining, mechanical, and electrical engineering, ceramics, industrial arts, chemistry and architecture; (4) the College of Law; (5) the College of Pharmacy; and (6) the College of Veterinary Medicine. The work is arranged for the group system of electives. There are also shorter courses offered in agriculture, dairying, domestic science, mining, clay working and ceramics, and industrial arts; and provision for graduate work. The instruction in agriculture, engineering, and science has always been a prominent feature of the university's work; and its laboratories, and museums of geology, agriculture, mechanics, and metallurgy are especially well equipped. A lake laboratory for biological study is maintained at Sandusky. Military drill is a part of the curriculum for men. Women are admitted to all the departments. The governing body is a Board of Trustees, appointed by the governor with the approval of the State senate for seven years. The campus contains 345 acres, of which 235 are set apart for the work in agriculture and horticulture. The income is derived from the land grant of 1862, from the annual Federal appropriation, and from a permanent annual grant from the State, established in 1891, and doubled in 1896. In 1910 the total income was \$420,000; the students numbered 3,275, and the faculty 220.

**Ohio University**, a State institution at Athens, Ohio, opened in 1809. The present organization includes the collegiate department, a school of music, a school of commerce (business course), a normal and a preparatory department; post-graduate work is also provided for. The three bachelor degrees of A.B., B.S., and Ph.B. are conferred, and the corresponding master's degrees. The university was founded in accordance with a provision in the terms of purchase made by the Ohio Company of Associates with the United States government and by the same provision was endowed with two townships of land; it also receives a State appropriation annually; in 1910 the income amounted to \$244,000; the library contained 30,000 volumes; the students numbered 1,100, and the faculty 58.

**Ohio Wesleyan University**, founded at Delaware, Ohio, in 1844, under the auspices of the Methodist Episcopal Church. The Ohio Wesleyan Female College was united with the university. Besides the collegiate department, there are schools of music, and of fine arts, a commercial department, a preparatory department, and a school of medicine. The bachelor's degrees conferred are bachelor of arts, bachelor of science and bachelor of letters. The school of medicine is located at Cleveland, and was formerly an independent school (founded in 1863), and was united with the university in 1896 under the title of the Cleveland College of Physicians and Surgeons of Ohio Wesleyan Univer-

sity. Women are admitted to all departments. The grounds and buildings in 1910 were valued at \$800,000; the library contained 60,000 volumes; the total income amounted to approximately \$250,000. In the same year the students numbered 1,342, the faculty 135; the total number of graduates was about 27,000, many of whom have entered the ministry.

**Ohm, ðm, Georg Simon**, German physicist: b. Erlangen 16 March 1787; d. Munich 7 July 1854. He was educated at the University of Erlangen. In 1817 he became a teacher at the gymnasium in Cologne, and in 1826 at Berlin; from 1833 to 1849 he was director of the polytechnic school at Nuremberg, and in 1849 went to Munich as professor of physics at the university. His researches were chiefly concerned with galvanic currents, and he formulated the law which is known as Ohm's law; that, the current is directly proportional to the electromotive force and inversely proportional to the resistance. This law was first stated in his 'Bestimmung des Gesetzes, nach welchem die Metalle die Kontaktelektrizität leiten' (1826), and was further developed and proved in his 'Die galvanische Kette mathematisch bearbeitet' (1827); in English 'The Galvanic Chain Mathematically Worked Out' (1841). He also wrote 'Beiträge zur Molekularphysik' (1849), and 'Grandzüge der Physik' (1854); his collected writings were published by Lommel in 1892. His name was given to the practical unit of electrical resistance in 1881. Consult Mann, 'Georg Simon Ohm' (1892).

**Ohm**, the practical unit of electrical resistance, adopted in 1881 by the International Congress of Electricians at Paris, the centimetre-gram-second unit formerly in use having proved too minute for convenient reckoning. The ohm, named after the German physicist Ohm (q.v.), equals 1,000,000,000 ( $10^9$ ) C. G. S. electro-magnetic units of resistance; a microhm is a resistance of one millionth  $\frac{1}{10^6}$  of the ohm; and the megohm is a measure 1,000,000 ( $10^6$ ) times the ohm. The ohm may be independently defined as the electrical resistance to an unvarying current offered by a uniform column of mercury at 0° C., 106.3 centimetres in length, with a mass of 14.4521 grams.

**Ohm's Law**, a fundamental principle in the mathematical theory of electricity, discovered in the early part of the 19th century by Dr. Georg Simon Ohm, a professor of physics at Cologne. It was first published in 1826. The law may be stated in the following manner: In any closed electrical circuit of resistance  $R$ , the current  $C$ , produced by an electromotive force  $E$  acting around the circuit, is given by the formula  $C = E/R$ ;  $C$  being measured in amperes,  $E$  in volts, and  $R$  in ohms. Some authorities regard this simple equation as a sort of truism, pointing out that the ampere is, by definition, the current generated by one volt in a circuit whose resistance is one ohm. Ohm's law is much more than a truism, however, because it states not only that one volt generates a current of one ampere in a circuit whose resistance is one ohm, but also that  $P$  volts, acting in a circuit whose resistance is  $Q$  ohms, generate a current of  $P/Q$  amperes. Ohm's law was first given for the case in which a constant electromotive force

acts in a simple linear circuit, but it may readily be generalized so as to apply to branched circuits and to circuits in which the electromotive force is variable. See **ELECTRICITY**; **RESISTANCE**; **UNITS**.

**Oh'mann-Dumas'nil, Amant Henry**, American dermatologist. b. Dubuque, Iowa, 30 Sept. 1857. He was graduated from the Missouri State University in 1877, and from the Saint Louis Medical College in 1880, and has since made dermatology his specialty. He is editor and proprietor of the Saint Louis 'Medical and Surgical Journal,' and has published 'Hand Book of Dermatology' (1898); 'History of Syphilis' (3 vols. 1899).

**Ohnet, Georges**, zhōrzh ô-nā, French novelist and dramatist: b. Paris, France, 3 April 1848. He was educated for the law but abandoned it for journalism, and in 1875 made his first success as a dramatist with 'Regina Sarpi.' His novels deal with the life and characteristics of the French bourgeoisie, and are extremely popular in his own country; several of his works have been translated into English successfully and he has dramatized many of his novels. Among his works are: 'Serge Panine' (1880); 'La Grande Marnière' (1885); 'Le Droit de l'Enfant' (1894); 'Gens de la Noce' (1900); etc.

**Oil**, an animal, mineral, or vegetable liquid, of more or less viscid consistence; nearly insoluble in water, but dissolves in alcohol or ether, and takes fire when heated in air, burning with more or less luminous flame. Oils are of various kinds, mineral, vegetable, essential, animal, and fixed or fat oils. Petroleum and naphtha come under the head of mineral oils.

**Oils in Chemistry** are all neutral fatty substances which are liquid at ordinary temperatures. The mineral oils, and many of the volatile oils of vegetable origin are simply compounds of carbon and hydrogen, but the larger proportion of vegetable and animal oils contain oxygen in addition, while a few also contain nitrogen and sulphur, as in oil of mustard. The vegetable and animal oils containing oxygen are mostly glycerides of fatty acids, and are characterized by being insoluble in water, slightly soluble in alcohol, but readily soluble in ether.

**Oils in Botany** are those in the form of minute drops in the cells of many, if not of nearly all, plants. They are of two kinds, essential and fixed oils, the former being special secretions in glands, glandular hairs, and hairs on parts exposed to light. Fixed oils are found chiefly in the cells of tissues, and have a relation to, or, at times, seem to occur as substitutes for starch. Some fruits contain oil in their perisperms; spores of cryptogamic plants and pollen grains have it in abundance.

**Oils in Art** are the fixed oils used in painting on canvas, etc., such as linseed, walnut, and poppy. They are expressed and purified in various ways, and rendered drying by the addition of the oxides of lead or zinc. Cold drawn linseed oil is the best for use, especially after being boiled upon charcoal to separate the mucilage and other impurities. These oils are the vehicles or media in which the pigments are ground and diluted for use; they should be pale in color, limpid, and transparent, and should dry quickly. The essential oils used in paint-

ing are those of turpentine for diluting the pigments ground in oil, and of spike or lavender for wax and enamel painting.

**Essential Oils**.—The essential oils have been arranged in four classes: (1) The hydrocarbons. (2) The oxygenated oils. (3) The sulphur oils. (4) The artificial oils or volatile oils, prepared by destructive distillation, fermentation and other processes. (For a detailed account of essential oils used in perfumes, soaps, etc., see the article **AROMATIC COMPOUNDS**.) The essential or volatile oils chemically considered do not form a natural class, for under them are included bodies of quite different constitution, and very frequently they are mixtures of different bodies. Thus oil of wintergreen is an ether, oil of cloves a phenol, oil of cinnamon an aldehyde, and so on. When they are mixtures they usually contain a hydrocarbon and an oxygen compound, which are sometimes separable by fractional distillation. At other times they may be separated by taking advantage of some striking property of the class to which one of the constituents may belong.

**Fixed Oils** are of two classes, drying and non-drying oils. The former class includes all oils which thicken when exposed to the air through the absorption of oxygen, and are converted thereby into varnish. They are all of vegetable origin, such as linseed, nut, poppy, and hemp-seed oil. Among those of the non-drying class are olive, cottonseed, colza, rape, ground-nut, castor, croton, etc. The non-drying oils (whether of vegetable or animal origin) when exposed to the air also undergo a change, resulting in the formation of acrid disagreeable smelling acid substances; this decomposition, which is only partial, seems to be brought about by the presence of cellular matter derived from the plant or animal which has yielded the oil, this substance acting as a ferment on the fatty matter, such acids as butyric, caproic, valerianic, etc., being thereby produced. The fixed oils are for the most part glycerides, that is, ethers of the triatomic alcohol glycerine, and are resolved by saponification into glycerine and such fatty acids as stearic, palmitic, and oleic. (See **GLYCERINE**.) The fixed vegetable oils are generally prepared by subjecting the seeds of the plant to pressure with or without heat; the animal oils are, for the most part, the fluid parts of the fat of the animal, and are separated by heat alone.

**Animal Oils**.—The animal oils comprise neat's-foot oil, train-oil, seal-oil, sperm-oil, porpoise-oil, cod-liver oil, shark-oil, etc. The uses of the fixed oils are very various. Many form important articles of food, others are used in medicine, numbers as lubricants, some in the composition of paints and varnishes. Others again are important sources of artificial light, or are extensively employed in the manufacture of soap, for this purpose being treated with an alkali.

**Mineral Oils**.—See **KEROSENE**; **NAPHTHA**; **PETROLEUM**.

**Oil Gas**.—Various oils, wax, tallow, and other substances when passed through heated tubes are resolved into combustible gases, which burn with a rich light. Oil gas was commonly used before the refining of petroleum and the introduction of electricity.

**Oil as Fuel**.—The production of successful

## OIL-BEETLE—OIL PAINTING

oil burners has resulted in the application of oil fuel to locomotives and marine transportation on a rapidly increasing scale; the locomotives of the roads that pass through the petroleum fields being in some cases almost exclusively operated by oil, while there are lines of steamers in which the use of oil fuel is also nearly exclusive. The most important tests in this country were those carried out on the steamship *Mariposa*, in a report on which Rear-Admiral Melville expressed his conviction that by future experimental work the engineering features of the problem would undoubtedly be solved, so as to render the fuel satisfactory to commercial interests, if not for use in the navy. See PETROLEUM.

**Oiled Roadbeds.**—A modern plan of making roadways dustless by incorporating crude oil into the dust of an ordinary earth road for the purpose of holding the dust down and securing a permanent roadbed has been introduced successfully on highways in various parts of the country, particularly in California, and the same scheme is now being utilized to secure dustless roadbeds on several of the principal railroads of the country. The system has proved so satisfactory that it is being rapidly extended, and at the present time there is an aggregate of over 1,000 miles of oiled roadbed on the various railroad lines of the United States. See PETROLEUM.

**Oil-beetle.** See BLISTER-BEETLE.

**Oil-bird, or Gua'charo,** a remarkable South American bird, allied to the nightjars, but now set apart in the family *Steatornithidae*, which contains only one species (*Steatornis caripensis*). It has the general form of a large nightjar, but differs in having a strong bill and in feeding on hard and dry fruits. It is about the size of a common fowl; the plumage brownish gray, with small black streaks and dots. The guacharo is found from Trinidad southwestward through Venezuela to Peru, and is widely known as the oil-bird, on account of the large amount of fat which the bird usually has, especially when young. It spends the day in deep and dark caverns, where great numbers congregate and make their nests on ledges in the shape of clay bowls, in which two dull white eggs are laid. Consult Newton, 'Dictionary of Birds' (1896).

**Oil Cake.** See FLAXSEED.

**Oil City, Pa.,** city, in Venango County; at the junction of Oil Creek and the Allegheny River, and on the Pennsylvania, the Lake Shore & M. S., and the Erie R. R.'s; about 130 miles north by east of Pittsburgh. It was settled about 1825, but was only a small place, with but few local manufactories, until the oil wells of the vicinity were developed in 1860. It was incorporated as a borough in 1863, and chartered as a city in 1874. A terrible catastrophe occurred on 5 June 1892; burning oil came down Oil Creek from Titusville, a distance of 18 miles, and swept over the city. More than 100 persons were killed and property to the amount of about \$1,010,000 was destroyed. The city is in the midst of the celebrated oil fields of Pennsylvania, and many of its industries are connected with the marketing of petroleum. Some of the prominent buildings are the Oil Exchange, the Standard Oil Company office buildings, the city hospital, church and

school buildings, and several building blocks. The educational institutions are the public and parish schools and the Carnegie Free Library. The government is vested in a mayor, who holds office three years, and a council. The school board, assessors, treasurer, and comptroller are elected by the people. The city owns and operates the waterworks. Pop. (1890) 10,932; (1900) 13,264; (1910) 15,657.

**Oil Cloth.** See FLOOR-CLOTH.

**Oil-fish,** the colloquial name of several fishes notable for yielding oil, as the menhaden (q.v.) of the eastern United States. Specifically, the Russian golomyinka (q.v.).

**Oil Fuel.** See OIL; PETROLEUM.

**Oil Gas.** See OIL.

**Oil of Mustard,** a volatile pungent and irritating oil formed in mustard by fermentation when it is wet.

**Oil Painting,** a method of painting in which the pigments used are ground in linseed oil, made from the seed of the flax plant, or in poppy oil; in many respects the most valuable of the various processes at the command of the artist who works in color. Apparently unknown to the ancients, and but little used by the earlier painters of the Renaissance in Italy, it has gradually come into wider use in succeeding schools of art, and at the present day has very largely superseded the older methods of tempera, encaustic and fresco, even for monumental mural paintings. In the important art of scene painting (q.v.) the use of distemper still prevails, for various reasons of practical convenience. The technical disadvantages under which the artist painter labors are probably reduced to a minimum by the use of oil colors, but they are by no means entirely removed. The oil itself is a yellow vehicle, and has a tendency to cause the colors to both yellow and darken with age; the pigments—even with all the science of modern chemistry applied to their fabrication—are frequently unreliable, being affected by time, by exposure to the atmosphere, smoke, gas, etc., by being mixed with each other, or even by contact with the steel of the palette knife, and, many of them, having a tendency to become useless by drying in their tubes. Paintings executed in this medium, liable to deterioration through all these causes, are also frequently injured by unskilful or careless technical methods,—cracking when the glazing or over-painting has been applied before the first painting was thoroughly dry, or because of the use of a medium, a varnish or a dryer, which does not dry nearly simultaneously with the pigments. Many of the paintings of the modern French school, executed in the highest period of the contemporary art, and by the recognized masters of the school, have cracked within twenty-five years of their execution. The use of bitumen—a great temptation to many painters because of its luminous, warm, dark tones—very frequently causes the painting to crack, as notably in the works of Munkacsy (q.v.). To prevent the yellowing of the oil vehicle it is usually thinned with turpentine, or is replaced in the painter's palette cups by a mixture of Siccatif de Harlem and turpentine, or turpentine alone, or refined kerosene, or even by some of the retouching varnishes. The use of an ab-



sorbent ground to paint upon also lessens this danger (while diminishing very considerably the lustre and beauty of the colors); Puvis de Chavannes (q.v.) used the common oil colors on a canvas prepared with plaster. Want of sunlight also causes oil paintings to yellow, and they can be partially restored by exposure to that light. Zinc white is much the safest white to use with oil. Oil painting cannot be used directly on a plaster wall because of the combination of the caustic lime with the oil, thereby forming a soap which destroys the durable qualities of the pigments and causes them to redden or yellow. The modern mural painters adopt the safer method of painting their pictures on canvas, which is then fastened to the wall with white lead. This method has the advantage of dispensing very largely with the disagreeable necessity of working on scaffoldings, frequently at a great height from the ground, as the old painters did. In general, heavy impasto, or the application of much color by many repaintings, and scumbling or glazing of thin color over another underneath, are more apt to lead to deterioration of the painting than the use of nearly pure colors applied sparingly and with but little thinning medium. The slow but gradual destruction of many of the world's masterpieces in this manner is a heavy loss; the paintings in the great Louvre galleries in Paris, left uncleaned, darken very perceptibly in the course of twenty years.

The invention of oil painting was ascribed in Vasari's time to the Flemish painter Jan van Eyck (q.v.) (died 1440), but something, at least, of the art had been known much earlier. In a technical work, the 'Book of Art' by Cennino Cennini, one of the later followers of Giotto (q.v.) (1276-1336), the mixing of pigments with boiled linseed oil is mentioned, though not with reference to artistic works. The brothers Van Eyck (Hubert and Jan), seem to be entitled to the honor of having first availed themselves of the great advantages possessed by the oil pigments with their slow drying qualities, which permitted the mingling of the colors on their palettes and their canvases. In the old tempera painting, the colors were laid on and dried, practically, one at a time. In the first half of the 15th century the painters of northern Italy heard of the new method of the Van Eycks, and experimented with it; Antonello da Messina (q.v.), a Sicilian painter (1414?-1496?), saw in the possession of Alphonso, king of Naples, a painting by Jan van Eyck, and was so much impressed by it that he journeyed to Bruges to study the new art, and brought it back to his compatriots in 1465. It was practised in Tuscany earlier than in Venice, and with different methods in Florence and Venice, but its adoption was gradual. It is related that Sebastiano del Piombo lost the friendship of Michelangelo (q.v.) by endeavoring to induce him to adopt this method for his 'Last Judgment' in the Sistine Chapel; and the almost complete destruction of Leonardo da Vinci's (q.v.) 'Last Supper' (1498) is attributed to the use of oil on the plaster wall, while the fresco (*buon fresco*) of the 'Crucifixion' by Donato Montorfano, painted in 1495, is still in good condition, though exposed to the same unfavorable conditions. Some of the Italian painters, including Perugino (q.v.), Pollajuolo (q.v.), and Andrea Verrocchio (q.v.),

employed a mixed method, partly oil and partly a species of tempera, in their easel pictures. A few of the moderns, as Gustave Moreau (q.v.), have combined this method with water-color, or other processes. It is remarkable that the very earliest oil paintings, those by the Van Eycks and their Flemish contemporaries, are among the most perfectly preserved of any that have come down to us. Several attempts to discover a satisfactory substitute for oil have been made in modern times, as, the water-glass (stereochromy) invented by the German chemist Von Fuchs, and practised by Kaulbach and his school and by the English painter Maclise, used for mural painting; the mixture of copal, wax, resin and oil by Lord Leighton and some of his compatriots in mural work, and, the latest, the "solid oil colors" of Jean François Rafaelli, the Parisian painter, for easel pictures. For the preference displayed by modern artists for this medium there are several reasons,—general convenience and ease of handling, and certain properties in the oil medium which seem to enable the painter better to represent—or, at least, suggest—the material aspects of Nature and of both animate and inanimate objects, real or imaginary. The materials and processes of tempera (q.v.), fresco (q.v.), water-color (q.v.), and pastel (q.v.), all possess various disadvantages, both material and artistic, for general use.

Consult: Dufresnoy et de Marsy, 'L'Ecole d'Uranie ou L'Art de la Peinture' (1753); Blanc, 'Grammaire des Arts du Dessin'; Couture, 'Methode et Entretiens d'Atelier'; Vibert, 'Peinture à l'huile'; Eastlake, 'Materials for the History of Oil Painting'; Cennini, 'Treatise on Painting.'  
WILLIAM WALTON,  
Author of 'Chefs d'Œuvre; Exposition Universelle 1889.'

**Oil-palm.** See PALM-OIL.

**Oil Shark,** a small shark (*Galeorhinus zyopterus*) of the southern Pacific coast, allied to the topes, grayish, and often six feet in length. Its liver yields a large quantity of valuable oil, and its fins are highly prized by the Chinese as a material for soup; hence this fish is sometimes called "soup-fin shark."

**Oil-stone,** a slab of fine-grained stone, set in a wooden block and provided with a wooden cover, used for imparting a keen edge to tools; it is so called because oil is used for lubricating its rubbing surface.

**Oil Wells.** See PETROLEUM INDUSTRY, THE.

**Oiled Roadbeds.** See OIL; PETROLEUM.

**Oise,** wāz, (1) a river of France, which rises near Selogney on the frontier, in the forest of Thierache, among the Ardennes, Hainaut, Belgium, flows southwest across the departments of Aisne-et-Oise, and joins the Seine about six miles below Pontoise in the department of Seine-et-Oise. (2) A northern department of France named after the river. Area, 2,272 square miles; pop. about 410,000. Capital, Beauvais.

**Ojeda,** ô-hā'dā, Alonzo de, Spanish cavalier and explorer: b. Cuenca about 1468; d. Santo Domingo 1515. He sailed with Columbus on his second voyage in 1493, and thereafter identified himself intimately with the exploration and occupation of the New World. In 1495 he performed a feat of great boldness in

## OJEDA — OKEFINOKE SWAMP

the capture of the cacique Caonabo. In 1499, with Juan de la Cosa, former pilot of Columbus, and accompanied also by Amerigo Vespucci, he explored the northern coast of South America from a point probably on the north of the present Brazil westward to the Gulf of Venezuela. On a charge of trespassing, during a second voyage in 1502, upon territory belonging to Portugal, he was arraigned after his return, and punished by censure and fine. After being imprisoned for debt in Spain, he sailed for the third time for South America in 1505, and explored to the Gulf of Darien. In November 1509, with over 300 men, he made an abortive attempt to capture Nueva Andalucia, between the Gulf of Darien and the Gulf of Venezuela, of which territory he had been appointed governor. Ojeda next established a colony at San Sebastian, but ran short of provisions, and, sailing for Hispaniola in quest of reinforcements and supplies, was shipwrecked on the coast of Cuba, dying in poverty and wretchedness at Santo Domingo.

**Ojeda, Emilio de**, Spanish diplomat. After holding several minor diplomatic posts he became first secretary of the Spanish embassy at London in 1880, was *chargé d'affaires* in Bolivia, and in 1883 minister resident in Montevideo, in 1884 at Lima, and at Athens 1888. In 1890 he was promoted minister plenipotentiary to Peru, and to Morocco in 1894. He was appointed secretary of the Spanish commission to arrange a treaty of peace with the United States in 1898, and succeeded the Duke de Arcos as minister to the United States in June 1902.

**Ojibway Indians.** See CHIPPEWAS.

**O.K.**, a term signifying all right, correct, the origin of which is generally ascribed to Andrew Jackson, seventh President of the United States. He is supposed to have endorsed official papers with these letters used as an abbreviation for the words *all correct*, spelled, either through ignorance or humorously, *oll korrek*. This story originated with Seba Smith (Major Downing) the humorist, and the term became a by-word in the Presidential campaign of 1832, being used by Jackson's opponents as an illustration of his illiteracy. The term has also been ascribed to an Indian chief, "Old Keokuk," who was accustomed to sign documents with the initials O.K.; and is now commonly used to signify worth, merit, or excellence.

**Oka, ô'ka**, Canada, a Catholic mission settlement of Iroquois, Algonquin, and Nipissing Indians, on the Lake of Two Mountains, near Montreal. It was settled by some 900 Iroquois Catholic converts from Sault au Recollet, in 1720, who were shortly afterward joined by Algonquin and Nipissing from the Isle aux Tourtes. The Mohawk and Algonquin languages are spoken by the respective bodies, who inhabit different sections of the village and number over 400. A branch settlement exists at Gilson, Ontario, since 1881.

**Oka, ô-kä'**, two rivers of European and Asiatic Russia. (1) Oka, in Europe, rises in the government of Orel, flows north till near the town of Kaluga, then east past that town, east-northeast across Riazan and the east of Vladimir, and after a course of about 600 miles, navigable from Orel, joins the Volga at Nijni-Novgorod. (2) Oka, Asiatic Russia, rises in

the mountains between China and the government of Irkutsk, flows north-northeast for 400 miles, and joins the Angara at Bratsk.

**Oka'pi**, the native African name of a large animal (*Ocapia johnstoni*) of the giraffe family which inhabits the forests of the upper Kongo Valley. It had been vaguely known previously, but the first specimen and description given to science were obtained by Sir Harry Johnston in 1899, in the Semliki forest, near the Uganda border. The animal has many of the features of a giraffe, such as drooping hindquarters, a short tufted tail, and a skull of similar shape, with vestiges of three horn pedicels or cores, but, of course, no external horns. The neck is short, thick, and maneless. The head is long and narrow, the ears large, the eyes far from ears, and the lips prolonged and mobile, suited to grasping the leaves of trees, upon which they are said by the negroes to feed. The size is that of a medium antelope, about  $4\frac{1}{2}$  feet tall at the withers. The colors are remarkable. The head, neck, and body generally, as described by Johnston, range in color from warm purplish red to sepia and jet-black; but the cheeks are yellowish-white; the legs are cream-white on their lower part, and above broken into rings or stripes of alternate black and white, extending on the hams up to the root of the tail. A single stuffed and mounted skin is deposited in the British Museum.

These animals seem uncommon, and dwell in almost inaccessible forests, where they are said to go about alone or in pairs. It is probable that they may be the lingering survivors of a species now nearly extinct which formerly ranged far more widely, especially to the northward, since Egyptologists at once recognized this animal as the prototype of the figure of the ancient Egyptian deity Set, whose curious head has heretofore eluded identification. For the discovery of the okapi, consult 'Transactions' and 'Proceedings' of the London Zoological Society (1901, 1902); and for its identification with the figure of Set, consult 'Scientific American Supplement' (28 March 1903), and the writings of Wiedemann.

**Okayama, ô-kä-yä'mä**, Japan, a town and capital of a prefecture of Bizen, on the island of Hondo, near the shore of the Inland Sea separating it from Shikoku, about 70 miles to the west of Kobe.

**Okeechobee, ô-ke-chô'be** ("Big Water"), a lake in Florida, in the southern part of the State. It is about 40 miles long and 28 miles wide; area, about 1,185 square miles, and depth from a few inches to 13 feet. It is on the northern border of the Everglades (q.v.), and it seems to be changing slowly, as no doubt the Everglades have changed. Vegetation is increasing within the lake and the marshy shores are encroaching upon the lake boundaries. Caloosahatchee River, by means of canals, has been made an outlet, but considerable of the water spreads over the Everglades. The canals mentioned have reduced the area of the lake and drained portions of the Everglades so as to make them suitable for raising certain crops. Okeechobee is the largest lake in the Southern States.

**Okefinoke (ô-kě-fî-nô'kē) Swamp**, in the southeastern part of Georgia, occupying nearly

all of Charlton County, and parts of Ware and Clinch Counties, and extending into Baker County in Florida. The area is about 500,000 acres. In the eastern part is a lake containing several small floating islands, the marshy shores of which show the same formation as Okeechobee (q.v.) Lake in Florida. In some parts of the swamp are large trees and a dense low vegetation. Alligators and moccasins inhabit this swamp in large numbers.

**O'Kelly, Charles**, Irish historian: b. Screen Castle, Galway, 1621; d. 1695. He was educated at the Irish College in Saint Omer, France, and upon the outbreak of the Civil War in England in 1642, took his stand with the king, but in consequence of the outcome of the war in Cromwell's favor was forced to leave the country and with about 2,000 compatriots and followers continued to render service to the royal house under Charles II in France and Spain, subsequently serving as colonel of cavalry. Upon returning to England after the Restoration, O'Kelly attended the Dublin Parliament of James II in 1689 as a representative of Roscommon. In 1691 he was entrusted with the defense of the island of Bofin against the Orange troops, but was compelled to capitulate and after the Treaty of Limerick retired to private life. He is perhaps better known as the author of the history of the Revolution, 'Macariae' (1692), of which three editions have appeared: (1) that of the Camden Society in 1842; (2) the annotated edition of 1850, prepared for the Irish Archaeological Society by J. C. O'Callaghan; and (3) that which appeared in 1894 as 'The Jacobite War in Ireland.'

**O'Kel'ly, James**, American Methodist Episcopal minister: b. Ireland about 1757; d. in North Carolina 1826. He came to this country, where in 1778 he became a Methodist preacher, traveling from place to place. When the Methodist Episcopal Church in the United States was organized (1784) he was one of the elders ordained, and later he held the position of presiding elder in the district of South Virginia. He was soon afterward found in opposition to his denomination regarding the life-tenure and powers of the bishops, and the General Conference of 1792 was followed by his withdrawal, which led to the first secession from that ecclesiastical body, several churches and ministers joining with O'Kelly to form the Republican Methodist Church. His determined fight against the Episcopacy, though it failed to dislodge the innovation of the bishopric, gave the practical ends for which he contended to the lower ranks of the Methodist ministry. By 1795 the defections from the Methodist Episcopal Church caused by O'Kelly's agitation reached almost 6,500. His Republican Methodist Church changed its name to "Christian Church" (q.v.). Consult: Buckley, 'History of Methodism in the United States' (1897).

**Oken, ö'kën, Lorenz**, German naturalist: b. Bohlsbach, Württemberg 1 Aug. 1779; d. Zürich 11 Aug. 1851. His real name was Lorenz Ockenfuss, abridged to Oken when he became a private teacher at Göttingen, having previously studied natural history and medicine at the University of Würzburg. In 1802 he published 'Grundriss der Natur-Philosophie,' in which he reduced to a system the materials

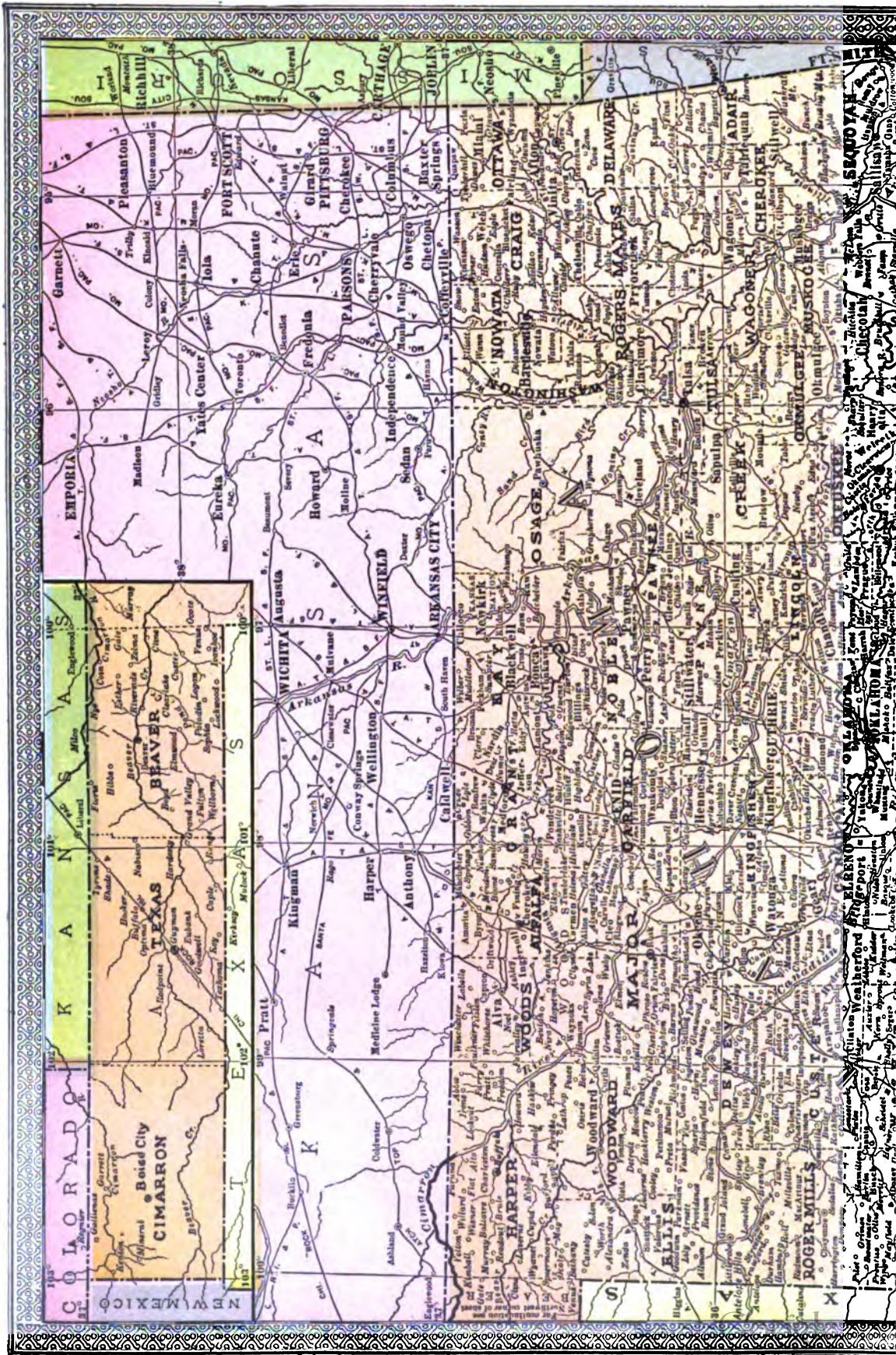
Fichte and Schelling had previously undertaken to arrange; in this he maintained that animal classes are simply a representation of the organs of sense, and divided the animal kingdom accordingly into five classes. In 'Die Zeugung' (1805) he advanced the doctrine that all organic beings originate from and consist of vesicles or cells. In 1807 he became extraordinary professor of the medical sciences of the University of Jena, giving for his inaugural discourse the famous essay 'Ueber die Bedeutung der Schädelknochen,' or 'On the Signification of the Bones of the Skull.' In 1808 he announced the propositions that organism is a combination of the activities of the universe, within a single individual body, and that world and organism are one in kind; that light is only a polar tension of the ether evoked by a central body in antagonism with the planets, and heat only the motion of this ether. His 'Lehrbuch der Natur-Philosophie' appeared 1809-11. In 1816 he began the publication of his periodical, the 'Isis,' devoted principally to natural science, but occasionally commenting on the politics of the German states; the criticisms on the latter led to complaints, and the court of Weimar required him either to suppress the 'Isis' or to resign his professorship; he chose the latter alternative, and published his journal at Rudolstadt uninterruptedly until 1848. In 1821 he originated the annual general meetings of German naturalists in different cities, the first of which was held at Leipsic in 1822; the British and American associations for the advancement of science have been since then instituted more or less after the German model. In 1833 he was appointed professor of natural history in the University of Zürich, which position he retained until his death.

**Okotsk, ö-kötsk'**; **Sea of**, an extensive inlet of the North Pacific Ocean, indenting the eastern coast of Russian Siberia. It is bounded on the north by the waste lands of Siberia, is separated from the ocean on the east by the Kamchatka Peninsula, and is partially inclosed by the Kuril and Urup islands on the east and southeast and by the island of Saghalin on the southwest. It is connected with the Sea of Japan by the La Pérouse Strait between Saghalin and Yezo islands, and also by the long passage between Saghalin and the mainland which broadens out into the Gulf of Tartary. The Sea is about 1,000 miles in length and 600 miles wide, is nearly rectangular in shape and its northern shore nearly follows the 60th parallel N. The climate and position will probably forever prevent the Sea of Okhotsk from becoming of great commercial importance; the coasts are steep, good harbors are few, and these are generally icebound from November to April. The open sea, is often fog-bound and subject to heavy storms, consequently is little frequented.

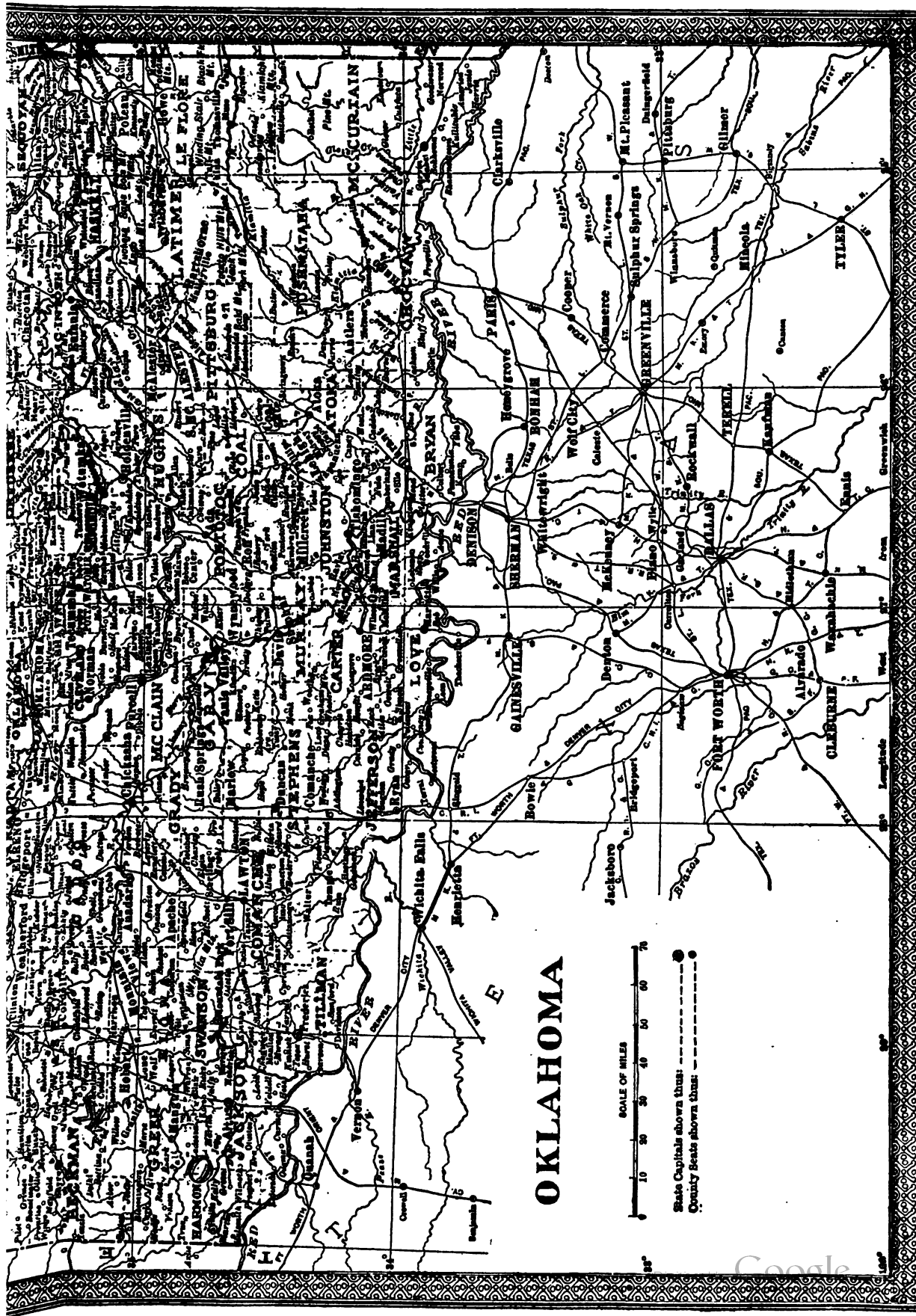
**Oklahoma**, a State of the United States, in the south central part, bounded on the north by Colorado and Kansas, on the east by Missouri and Arkansas, on the south by Texas, and on the west by Texas and New Mexico. The old territories of Oklahoma and Indian Territory are now Oklahoma State, having been combined and admitted to statehood by President Roosevelt's proclamation of 16 Nov. 1907, after the passage of an Enabling Act, 16 June 1906. The











# OKLAHOMA



State Capitals shown thus: ●  
County Seats shown thus: ○





# OKLAHOMA

area of the State is 70,557 square miles, and its population (1910) 1,657,155. The counties into which the new State was divided and subdivided are now constituted, with their population and county seats, as follows:

Counties.	Population.	County seat.
Adair.....	10,535	Westville.
Alfalfa.....	18,138	Cherokee.
Atoka.....	13,808	Atoka.
Beaver.....	13,631	Beaver.
Beckham.....	19,699	Sayre.
Blaine.....	17,960	Watonga.
Bryan.....	29,854	Durant.
Caddo.....	35,685	Anadarko.
Canadian.....	23,501	El Reno.
Carter.....	25,358	Ardmore.
Cherokee.....	16,778	Tahlequah.
Choctaw.....	21,862	Hugo.
Cimarron.....	4,553	Boise City.
Cleveland.....	18,843	Norman.
Coal.....	15,817	Lehigh.
Comanche.....	39,855	Lawton.
Craig.....	17,404	Vinita.
Creek.....	26,223	Sapulpa.
Custer.....	23,231	Arapaho.
Delaware.....	11,469	Grove.
Dewey.....	14,132	Taloga.
Ellis.....	15,375	Grand.
Garfield.....	33,050	Enid.
Garvin.....	26,545	Pauls Valley.
Grady.....	30,309	Chickasha.
Grant.....	18,760	Medford.
Greer.....	16,449	Mangum.
Harmon.....	11,328	Hollis.
Harper.....	8,180	Buffalo.
Haskell.....	18,875	Stigler.
Hughes.....	24,040	Holdenville.
Jackson.....	23,737	Altus.
Jefferson.....	17,430	Ryan.
Johnston.....	16,734	Tishomingo.
Kay.....	26,999	Newkirk.
Kingfisher.....	18,825	Kingfisher.
Kiowa.....	17,478	Hobart.
Latimer.....	11,321	Wilburton.
Le Flore.....	29,127	Poteau.
Lincoln.....	34,779	Chandler.
Logan.....	31,740	Guthrie.
Love.....	10,236	Maretta.
McClain.....	15,659	Purcell.
McCurtain.....	20,681	Idabel.
McIntosh.....	20,961	Eufaula.
Major.....	15,248	Fairview.
Marshall.....	11,619	Madill.
Mayes.....	13,596	Pryor.
Murray.....	12,744	Sulphur.
Muskogee.....	52,743	Muskogee.
Noble.....	14,945	Perry.
Nowata.....	14,223	Nowata.
Okfuskee.....	19,995	Okemah.
Oklahoma.....	85,232	Oklahoma.
Oklmulgee.....	21,115	Oklmulgee.
Osage.....	20,101	Pawhuska.
Ottawa.....	15,713	Miami.
Pawnee.....	17,332	Pawnee.
Payne.....	23,735	Stillwater.
Pittsburg.....	47,650	McAlester.
Pontotoc.....	24,331	Ada.
Pottawatomie.....	43,595	Tecumseh.
Pushmataha.....	10,118	Antlers.
Roger Mills.....	12,861	Cheyenne.
Rogers.....	17,736	Claremore.
Seminole.....	19,964	Wewoka.
Sequoyah.....	25,005	Sallisaw.
Stephens.....	22,252	Duncan.
Swanson.....	11,682	Snyder.
Texas.....	14,249	Guymon.
Tillman.....	18,650	Frederick.
Tulsa.....	34,995	Tulsa.
Wagoner.....	22,086	Wagoner.
Washington.....	17,484	Bartlesville.
Washita.....	25,034	Cordell.
Woods.....	17,567	Alva.
Woodward.....	16,592	Woodward.

The principal cities are Ardmore (8,618), Chickasha (10,320), Enid (13,799), Guthrie (11,654), McAlester (12,954), Muskogee (25,278), Oklahoma City (64,205), Shawnee (12,474), and Tulsa (18,182). The rapidity of growth of some of the towns and cities has been remarkable, as well as the way in which they came into existence. The site of Thomas,

in Custer County, was chosen by persons who went into the old Oklahoma Territory on an excursion train. The train was stopped when a suitable place was found, and before night it was a good-sized town with a daily newspaper.

*History.*—Indian Territory, before consolidation, was the eastern half of the present State of Oklahoma, and Oklahoma Territory was the western half. The histories of the two sections is parallel. Indian Territory was part of the Louisiana Purchase. The oldest white settlement is Vinita in Cherokee; the oldest in the southeast is Caddo; the best known has always been Tahlequah, for some generations the capital of the Cherokee Nation. Glancing at the records of this territory, first we find that early in the 19th century many of the Southern Indians, their old hunting grounds invaded by the whites, removed to this virgin forest. In 1832 it was fixed on by the national government as a place for the tribes whom agreements with the Southern States had bound us to deport, and in 1834 special reservations were set apart. The Five Civilized Tribes, as they are called, established governments on the civilized model, with elected legislature, council and governor, courts and schools and responsible financial management, and even newspapers in the Cherokee tongue, with Sequoyah's famous alphabet. But the vast enclave of nearly 70,000 square miles in the heart of a swelling settlement could not be maintained, and the Indians from some constitutional blight do not grow to fill their districts. In 1866 some 5,500,000 acres were purchased of the Indians in the present Oklahoma; on 22 April 1889 over 3,000,000 acres were thrown open to settlement; on 2 May 1890 this and other territory was formed into Oklahoma Territory. Meantime the old system in the eastern part was going to wreck, not so much from the white immigration, following the railroads which began to cross it, as from internal development which was making the primal object of the system a mockery. It was designed to protect the half-helpless Indian from white greed till he could stand on his own feet; in fact, the half-breeds and the intermarried whites were rapidly appropriating everything to themselves, while the full-blood was "crowded out upon the mountain and unproductive land, to take care of himself as best he could." (Dawes Commission.) The tribal governments were under control of these governments and were "recklessly leasing the community lands to cattlemen and coal companies" (Hinton), to railroads, oil and lumber companies, etc. The government, therefore, set about negotiating to break up the tribal governments, and turn the Territory into a set of ordinary civilized communities with ownership in severalty, protecting the Indian for a time by restraining his liberty of alienation. The Dawes Commission of 1893 began this work; in 1897 the United States extended its judicial power over the district; in 1898 the Curtis Act carried out the work, providing for the enrollment of citizens, for allotment of lands, for laying out town sites and incorporating towns with power to elect officers and tax themselves for schools, etc., and giving the President a veto power over the tribal legislatures. The arrangements vary with the different tribes; the Seminoles continue their government after a fashion for the present, the Choctaws and

## OKLAHOMA

Chickasaws with some modifications till 4 March 1906. The territorial government consisted of four federal judges or one court of appeals and four district courts, with 20 commissioners acting as petty courts and justices of the peace, and a resident Indian Inspector.

Regarding the historical development of the old Territory of Oklahoma, we find that the earliest mention of the country included in the Territory is that by Don Diego Dionisio de Penalosa, a Spaniard who traveled through this region in 1662. He reported it as "pleasant and delightful," far exceeding in beauty "New Spain." The Louisiana Purchase of 1803 included all the land now in the Territory, except Beaver County, which was originally a part of the republic of Texas. When Texas became a part of the United States, the lands north of lat. 36° 30' N., the northern boundary of slave territory, were ceded to the United States, and Texas came into the Union as a slave State. Oklahoma was a part of the original Indian Territory (q.v.). The official act whereby this portion of the Reservation has become a home for white settlers has to do with the third article of the treaty of 14 June 1866 (14 Stats., 786), wherein the Creeks ceded and conveyed to the United States to be used as homes for other civilized Indians an area estimated to contain 3,250,560 acres. The United States agreed to pay the sum of 30 cents per acre, amounting to \$975,168. When the ceded lands were surveyed and subdivided it was found that the area ceded contained 151,870.48 acres in excess of the estimated amount and Congress, by the act of 7 July 1884 (23 Stats., 212), appropriated money to pay for the excess. By article 3 of the treaty of 21 March 1866 (14 Stats., 756), the United States ceded to the Seminoles 200,000 acres of the lands obtained from the Creeks under the Creek treaty above mentioned. Under the provisions of the act of 5 Aug. 1882 (22 Stats., 265), 175,000 acres lying east of the line dividing the Creek country purchased from the Creeks for the Seminoles, were also bought from the Creeks for the Seminoles. By the act of 1 March 1889 (25 Stats., 757), the Creeks ceded to the Government "the entire western half of the domain of the said Muscogee (or Creek) Nation lying west of the division line surveyed and established under" the treaty of 1866, and by the act of 2 March 1889 (25 Stats., 980), section 12, the Seminoles ceded to the Government lands estimated to contain 2,167,000 acres, being the lands ceded to them by the treaty of 1866. The survey subsequent to the treaty of 1866 showed the lands so ceded aggregated 2,037,414.62 acres. These lands together with cessions from certain other bands constitute what might be termed "Old Oklahoma." By section 10 of the Act of 3 March 1893 (27 Stats., 612), the Cherokees ceded to the Government what was then known as the Cherokee Outlet. The lands ceded by the cessions above mentioned and those referred to constitute Oklahoma as it now exists. Prior to the final settlement granting permission to the "whites" to secure "homesteads" or hold farms in this Territory, there were various attempts made to obtain forcible possession of the rich agricultural lands. United States troops on several occasions had to remove the intruders. In April 1879 and in February 1880 President Hayes issued proclamations ordering the in-

truders from the land and directing their removal by military power if necessary. In 1884 the would-be settlers became more persistent and organized themselves into an armed body prepared to resist removal. They surrendered to the Government forces in January 1885. The next year Congress authorized the President to begin negotiations with the Indians for the purchase of lands, with results as has been stated. The crop failure the first year after organization was a check to Oklahoma. Congress sent aid and the railroads loaned to the settlers, without interest, 25,000 bushels of seed wheat. The cession and purchase of the different tracts of land added to the Territory have already been mentioned. Greer County in the southwest, which had been in dispute between the Federal Government and Texas, was added to Oklahoma in 1896. The Kiowa, Comanche, and Apache and Wichita reservations, were opened for settlement in July 1901. The Fort Sill Military Reservation, 60,000 acres, is southeast of the Wichita Mountains and in Comanche County. The Oklahoma Territory was created 2 March 1890, and 27 August of the same year the first legislature met in Guthrie. In 1891 Congress was petitioned to admit Oklahoma as a State. In 1903 another attempt was made to obtain statehood. Oklahoma Territory had seven governors. Governors were appointed by the President of the United States and more were reappointed.

**Government.**—The Enabling Act was passed 16 June 1906, providing Statehood for Oklahoma and the Indian Territory as one State. In that act the capital was located at Guthrie until 1915. Oklahoma was given two sections in each Congressional township, and granted \$5,000,000 in lieu of Indian allotments, for educational institutions. On 6 Nov. 1906 delegates were elected to draft a State constitution. A year later (17 Sept. 1907) this constitution was ratified by the people, who also approved a prohibition law and elected C. N. Haskell, a Democrat who has since figured considerably in national politics, as first governor. Many advanced theories of government were incorporated into the constitution, including the initiative and referendum, requiring only 8 per cent of the voting population to sign a petition to have a measure voted on by the people. To propose constitutional amendments requires 15 per cent. According to the constitution the railroads and other public service corporations are controlled by a commission of three men elected for six years. Appeal may be taken from their decisions to the Supreme Court. Oklahoma's local history during the first four years of its existence as a State was turbulent, due in part to the unusual necessity of amalgamating two separate territories and preparing for the care of an increase of more than double the population. Great excitement prevailed for the last six months of 1910, beginning with the election of 11 June, when it was decided to change the capital from Guthrie to Oklahoma City. On 15 November the Supreme Court decided that the ballot used in the election was illegal and, therefore, Guthrie remained the capital. This condition remained until the close of the year, when the State militia was called out to assist in quelling the Guthrie mobs when the records were moved. When the election was held, in June 1910, W. ?



1. Birdseye View of Oklahoma City.
2. Interior View of Overholser's Opera House, Oklahoma City.



## OKLAHOMA

Anthony, Governor Haskell's secretary, seized the State seal and in an automobile carried it to Oklahoma City before he could be stopped. Bitter feeling existed in Guthrie and the capital was only completely removed after many threats of violence. Negro disenfranchisement was openly attempted in Oklahoma at the November elections on the question of illiteracy. This was done to a certain extent but the decision of Attorney-General West that no precincts could be thrown out unless gross fraud was shown on the face of the returns, prevented a wholesale disenfranchisement.

*Topography.*—The government survey authorized in 1894, when the reduction to civilized conditions was undertaken, found the Eastern part of the present State of Oklahoma to be one fourth mountainous plateau, and two thirds woodland well distributed, mainly through the east and southwest portions. The prairie section is a continuation of the Kansas plains, and occupies most of the old Cherokee district north of the Arkansas, and the Creek triangle between the Arkansas and Canadian, with about a fourth of the western half below the Canadian, the rest being timber land. In the extreme northeast is a rugged plateau cut by streams with a southward trend, west of which is a rolling plain with some hills. South of this the Ozark mountain chain, entering from Arkansas, stretches from northeast to southwest, with a gradual declension; from about 2,500 feet high near the Arkansas line, they sink to about 1,000 feet near the central line of the State. Their more pronounced elevations are termed the Boston, Poteau, Kiamichi, Sans Bois (treeless), Shawnee, etc. In the old Chickasaw territory at the south, a set of low elevations from Tishomingo northwest, rising in the sharp spur called the Arbuckle Mountains, and again farther on in the Wichita Mountains to the west, connect the Ozarks with the outliers of the Rockies. The highest elevation in the eastern part of the State is about 3,000 feet above sea-level, the lowest 350. The timber north of the Canadian is mainly confined to a belt in the centre of the State, save for cottonwoods, elms, pecans, and a few other sorts along the streams; south of it the timber occupies much the greater portion. The eastern part of the State is nearly all well wooded, the mountainous parts most heavily so; the woods besides the above are oak, largely in a belt from the Arkansas to the Red called the Cross Timbers (used only for fuel and railroad ties, not for construction), with valuable yellow pine and red cedar on the elevated grounds, and walnut in the bottoms. The drainage of the eastern part of the State belongs entirely to the Arkansas and Red River systems. The former, flowing across and cutting off a northern cantle, is joined east of the centre at Webber's Falls by the long Canadian, its main affluent; and is further fed from the north by the Neosho and the Verdigris joining close together, and by the Illinois near the Canadian. The latter has hardly any water-shed on the south. Nearly the whole southern portion is drained by the affluents of the Red, forming the entire boundary with Texas; the chief are the Washita in the southwest and the Kiamichi in the southeast.

The surface of the centre of the State to the west is rolling; the east side of the North Fork

of the Canadian River, and nearly parallel with the stream, are the Chautauqua Mountains, which are really a chain of hills composed of massive gypsum. In the southern part of the Territory are the Wichita Mountains, a group of granite and porphyry mountains, some of the peaks 1,200 feet from the base. The highest land is in the extreme northwestern part of the State, a portion of the Great Plains which increase in altitude toward the west until they reach the Rocky Mountains. Along the northwest boundary these plains are approximately 3,500 feet in height. The divides extend southeast and northwest; the river basins within are long and narrow. The Arkansas River crosses the State at the centre of the northern border. The Salt Fork of Arkansas River enters the State from the north, west of the center of the northern boundary, and flows east into the Arkansas. The Cimarron, whose head-waters are in the northeastern part of New Mexico, enters from Kansas and flows southeast and northeast and enters the Arkansas at the centre of the State. The North Canadian, in its upper course known as Beaver River, also rises in New Mexico and flows southeast, uniting with the South Canadian. The South Canadian enters from Texas. The Red River forms a portion of the southern boundary, and receives a number of large tributaries from Oklahoma, principally the Washita and the Salt Fork and the North Fork of the Red.

*Climate and Rainfall.*—The U. S. Dept. of Agriculture has a Weather Bureau at Oklahoma, Okla., where the record of 19 years to 31 Dec. 1909, showed a lowest temperature record of 17° below zero, and a highest of 108° above. The normal annual mean temperature here is 59° for the 33-year period from 1873 to 1905, inclusive. The average annual precipitation is 31.7 inches for the 36 years from 1871 to 1906, inclusive. The State belongs to the southern division by temperature and to the middle one by precipitation. Nowhere is the rainfall too scant for favorable agricultural conditions.

*Flora.*—The native timber of Oklahoma consists of the usual western varieties—several varieties of oak, elm, ash, hackberry, hickory, pecan, cottonwood, willow, walnut, cedar, etc. In the western portion the timber is found, for the most part skirting the streams. In the central and southern portions there are extensive areas of the timber of the varieties mentioned. The so-called black jack covers a large part of the southern portion. This furnishes a fine quality of fuel, and the land when cleared is very fertile, this being the best cotton belt in the State. There are more than 100 varieties of native grasses. Many of these make excellent pasturage and hay; it is this abundance of summer and winter pasturage together with its mild climate that has made Oklahoma famous as a stock country. Over 1,000 plants were listed by the State Geologist. Many of the towns—notably Perry, Stillwater, Norman—have made large plantings of trees, which have grown successfully. Locust, maple, ash, and elm being the most cultivated.

*Fauna.*—The characteristic species are the timber and prairie wolves, panthers and foxes, black bear, deer, prairie dogs, and some smaller game. The wild turkey is the most important bird.

*Agriculture and Stock Raising.*—The soil of



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the river valleys is very fertile; it is mixed with a rich black alluvium, making a contrast to the red clay and rock formation of the uplands. A large portion of the State is covered with a soil suitable for agricultural purposes and at present not needing fertilizers. Agriculture and stock raising are the natural occupations for a region so situated as Oklahoma. Wheat and corn are the chief products at present. Cotton is easily cultivated, the yield per acre is excelled only by Texas. Other valuable crops are vegetables, fruit, tobacco, sugarcane, flowers (plants, seeds, and blossoms), and nursery products. Potatoes, onions, sweet potatoes, melons, and fruit are receiving especial attention. Apples, pears, peaches, plums, apricots, and grapes are the chief fruits.

The State has 189,438 farms (1910), having a total acreage of 28,717,000, of which 17,496,000 acres are cultivated; the average number of acres per farm being 152. The value of lands and buildings is \$736,473,000; of land, \$647,178,000, which is an increase of 333 per cent in 10 years; value of buildings, \$89,295,000; and of farm implements and machinery, \$27,003,000. The average value per acre of land alone is \$22.54. In 1910, \$9,794,000 was spent for farm labor, an increase of 166 per cent in 10 years. There were 20,528 farms held by Indians, Negro, and other non-white farmers. The number of farms irrigated in 1910 was 137, comprising 5,402 acres, although the area which the irrigation was capable of supplying was 7,411. The total cost of the irrigation systems was \$45,200, or \$6.10 per acre.

Oklahoma's leading crops in 1909 were: Corn, 94,032,826 bushels, valued at \$47,951,374; wheat, 13,991,438 bushels, \$13,837,189; oats, 16,566,354 bushels, \$7,155,643; hay and forage, 1,410,346 tons, \$9,597,855, including alfalfa, 321,367 tons, \$3,227,619, and prairie grasses, 600,838 tons, \$3,356,639. On 15 April 1910, the State had horses and colts to the amount of 704,317, valued at \$60,364,786, which was a greater value than that of any other domestic animals. Cattle numbered 1,859,058, valued at \$40,953,906; mules, 241,231, \$26,781,855; swine, 1,737,826, \$11,272,295; poultry, 8,501,237 fowls, \$3,713,943. The total value of live stock was \$144,276,068. In the western counties more attention is given to stock raising than in the more fertile portions of the east.

*Geology and Mining.*—Geologically, the eastern part of the State may be divided into four sections: (1) The Arbuckle-Wichita region, with an outlying granite field at Tishomingo. This contains coal measures on the north and asphalt on the south; the former is the chief mineral product. Large bituminous asphalt deposits occur in the old Choctaw and Chickasaw Nations; these have been worked some, but owing to the want of railroad facilities, and the asphalt trust, the operators have not been encouraged until lately with very great success. There are also sandstone and limestone as well as granite. (2) The Ozark system, Carboniferous and Silurian, containing zinc and lead. (3) The northern prairie, Carboniferous, with coal and large quantities of petroleum. (4) The southern plains cropping over from Texas, underlain by the Cretaceous, with artesian strata, and sand and marl above. There are valuable gold and silver deposits from which Indians long made all their trinkets, but kept

the places secret, to prevent an influx of miners. In the eastern part is the Carboniferous area, as in a large portion of the central part of the United States; the high land of Beaver, Woodward, Day, and other western counties in the northwest is covered with Neocene deposits; but the most of the territory has a surface rock of red Permian shales and sandstone. In the Wichita Mountains in the southern part are found Silurian strata and Archæan rocks. Coal is found in the eastern part of the State chiefly in the Osage Nation; copper in Beaver County; building stone in most parts of the State also small amounts of gold, silver, and iron. The most valuable minerals, however, are salt and gypsum, both of which are found in practically inexhaustible quantities. Salt occurs chiefly in the form of brine springs giving rise to extensive salt plains, of which there are seven in Oklahoma. The combined flow from these springs exceeds 10 second-feet. The brine is practically a saturated solution. The Oklahoma gypsum deposits are the largest in the United States. The product occurs either in the form of massive white ledges of rock gypsum, some of which are 200 miles long, others 115 feet thick; or as gypsite, otherwise known as earth gypsum. The greater part of these deposits occur along three rows of gypsum hills. Cement, stucco, and plaster are manufactured from the gypsum. In 1909, the State produced 3,119,377 short tons of coal, valued at \$6,253,367, and had 536 coke ovens; it produced 47,859,218 barrels of petroleum valued at \$17,428,990; and was the fifth State in the Union in the production of natural gas, with 28,036,976 M cubic feet, valued at \$1,806,193.

*Manufacturing.*—While Oklahoma is an agricultural and stock-raising region, the manufacturing industries are increasing. The chief manufactures are flour and grist mills, cotton-gins, cottonseed oil mills, fruit canneries, cracker factories, meat-packing establishments, machine-shops, brick plants, agricultural implement shops, railroad shops, tobacco factories, creameries, salt plants, cement and plaster mills. In 1909 there were 2,310 manufacturing establishments, employing \$38,873,000 capital, and 15,336 persons. The materials used in these works cost \$34,153,000; \$9,285,000 were paid in salaries and wages, and \$3,778,000 in miscellaneous expenses; and the value of the products was \$53,682,000, an increase of 119 per cent over that of 1904.

*Transportation and Commerce.*—The Atchison, Topeka & Santa Fé R. R. crosses the State and has branch lines entering all the large cities. Other railroads that enter many of the counties are the Chicago, R. I. & P., the Saint Louis & S. F., the Choctaw, O. & G., and with other lines which do not cross any large section of the State, furnish connection with many of the great trunk lines of the country. Total mileage, 1909, including graded right of way, 5,785.06. The taxes and assessments on these lines that year amounted to \$2,643,003. (See OKLAHOMA CITY.) The rivers are not navigable. The products exported from Oklahoma in large quantities are wheat, cattle, corn, cotton, hogs, coal, and manufactures. The State had 15 street railway companies in 1909, operating 215 miles of electric railway tracks.

*Banking and Finance.*—On September 1, 1910, Oklahoma had 215 national banks with a

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total capital stock of \$8,620,000; surplus, \$2,384,293, and undivided profits, \$1,040,299; also 680 State banks, and 3 stock savings banks (the latter with \$65,000 capital stock, and \$453,813 deposits), and 2 loan and trust companies. The bank clearings of Oklahoma City (1910) were \$120,488,700. The total assessed valuation of property in the State was \$800,000,000; the tax rate, \$2.50 per \$1,000; and the bonded debt, \$1,460,000. In February, 1908, compulsory insurance of deposits in the State banks of Oklahoma was carried into effect. In September, 1909, occurred the failure of the Columbia Bank and Trust Company which had the largest deposits of any bank in the State. A year before failure its deposits had increased from \$255,000 to \$1,300,000. With only \$400,000 in the guarantee fund the State began the payments of liabilities amounting to \$2,000,000. Emergency assessments of  $\frac{3}{4}$  of 1 per cent were made, and three months after the failure all liabilities were paid. The insurance of deposits was not blamed for this failure, but was held partly responsible for several smaller failures.

**Education.**—There were 1,059,686 children of school age in Oklahoma in 1909, of whom 381,329 were enrolled, the average daily attendance was 237,377, and the average number of school days in a year, 140. Male teachers numbered 2,113, and female, 6,623; a total of 8,736. The teachers' salaries were estimated at \$2,700,000, and the whole expense of school administration was estimated at \$3,300,000. There is one law school, 2 medical schools, 40 high and private schools, 3 normal schools, and 6 technical schools and colleges.

**Charities and Corrections.**—The State penitentiary at McAlester was practically completed in 1910, and 1,235 convicts were imprisoned there. The reformatory was established at Granite, and will cost, when completed, \$750,000. The penitentiary cost \$1,000,000. Schools for the deaf, blind, and juvenile delinquents have also been established. Three large insane asylums were occupied in 1910, one at Supply, accommodating 500, the Eastern Hospital for the Insane and the Normal Insane Asylum. Orphanages supported by the Federal Government are filled with Choctaw and Creek Indian children, and the Whitaker Home for Orphans was overcrowded with 140 children.

**Oklahoma, University of,** the Territorial University opened in 1892 at Norman. Its departments include the (1) College of Arts and Sciences, which offers beside the regular collegiate courses, a combined collegiate and medical course and collegiate and engineering course; (2) the School of Pharmacy; (3) the School of Fine Arts; (4) the preparatory department; (5) School of Medicine (two years of regular four years' course accredited by leading medical colleges); (6) School of Applied Science; (7) School of Mines. The collegiate department confers two bachelor degrees, A.B. The university is coeducational, and women are members of the faculty. It is supported mainly from the income of lands reserved and an annual State tax; tuition is free to residents of Oklahoma. The bill providing for the admission of Oklahoma as a State provides 250,000 acres of public land for the University. One third of section 13 in the new State is

apportioned to the University and the University Preparatory School. The students number over 600 and the faculty 36.

**Oklahoma City,** Okla., county-seat of Oklahoma County; on the North Fork of the Canadian River, and on the Atchison, T. & S. F., the Choctaw, O. & G., the St. Louis & S. F., the Oklahoma City & W., the Missouri, K. & O., the Texas & O., Oklahoma Terminal, and Oklahoma City & N. I. R.R.'s; about 30 miles south of Guthrie.

**Commerce and Industries.**—Oklahoma City is the commercial and industrial centre of a productive agricultural and stock-raising region. It has a large number of wholesale houses. The chief manufacturing establishments are cotton mills, flour mills, breweries, box and cracker factories, patent medicine factories, iron works, soap factories, woodwork shops, and others having in all 1,250 employees. It has an extensive trade as it is the distributing centre for a large region; and the grain, cotton, and live-stock of the surrounding country is mostly shipped from Oklahoma City to eastern and southern markets.

**Educational Institutions, Churches, Etc.**—The city is the seat of the Epworth University, Sisters of Mercy College for Girls, and the Oklahoma Military Institute. It has public and parish schools, and a Carnegie Free Public Library. There are a number of good church buildings, the Sacred Heart Abbey, and Saint Anthony's Hospital. The city has a number of banks, with a combined capital of about \$1,000,000.

**History, Government and Population.**—Oklahoma City was settled 22 April 1889 by 3,000 men who came on railroad trains and horseback from the territory line, after noon on 22 April 1889, when by proclamation, the country was declared open to settlement. It was incorporated July 1890 and chartered as a city April 1891. The government is vested in a mayor and a council of 10 members elected every two years. The city owns and operates the waterworks. The population is nearly all American-born white people, about 2 per cent are negroes and 3 per cent Indians. Pop. (1910) 64,205.

E. E. BROWN,  
Editor 'Times-Journal.'

**Oklawha** ("crooked water"), a river in Florida which has its rise in the central part of the State, flows almost due north for about 80 miles, turns abruptly, and flows east into the St. John about 20 miles south of Palatka. It is about 200 miles long.

**Ok'ra**, a vegetable, the "gumbo" of Louisiana, and the "gumbo" of France (*Hibiscus esculentus*). It is a native of the West Indies, but flourishes in all tropical and sub-tropical countries and is common in the United States, where its pods are employed green as an esculent. Its mucilaginous pods are used in Louisiana to thicken the soup called chicken-gumbo. During the Civil War the seeds were utilized in the South as a substitute for coffee. A few years ago the fibre from the okra stalks was tried as a substitute for jute in the manufacture

of cotton bagging, but it was demonstrated that the culture of okra for its fibre could not be made a paying industry in this country. In India the fibre has been used in a small way for the manufacture of rope, twine, sacking and paper. It is less than half as strong as common hemp and is inferior to jute. Consult authorities mentioned under FIBRE, especially 'Report No. 6,' Office of Fibre Investigations, U. S. Department of Agriculture. See HIBISCUS.

**Okubo, Toshimichi**, ôk'oo-bô, Japanese reformer and statesman: b. in the province of Satsuma 1829; d. Tokyo 14 May 1878. He displayed from childhood evidences of great ability. He was special adviser of the Prince of Satsuma, who was the great exponent of the restoration of the Mikado to supreme power. His political sagacity was amazing. From the first he penetrated the designs of Russia in the Far East and for this reason, after his return from Europe in 1872 he opposed the war with Korea, knowing that temporary success, before Japan was modernized, would simply be playing into Russia's hands. It was Okubo's manifesto in 1868 that brought the Mikado from palace seclusion behind the screen of mystery into public life, and removed the capital to Tokyo. From 1870 until his death he was the most powerful minister in the imperial cabinet, and the personification of energy and progress. As special envoy to China in 1874, he settled the Formosan episode. The suppression of the Satsuma Rebellion in 1877 settled Okubo's policy as the permanent one for Japan. He was assassinated 14 May 1878, but received posthumous honors from the emperor. Consult his life by Maurice Courant (Paris 1904).

**Okuma, ôk'oo-mâ, Shigenobu**, Japanese statesman: b. province of Kiushiu, Hizen, 1837. Early in life he became an advocate of advanced reforms, the abolition of the feudal system, the restoration of the emperor to power, and a new system of education; and his persistent and courageous advocacy of these reforms was influential in bringing about the revolution of 1867-8. After the reorganization of the Japanese government he was appointed to a position in the foreign office, and in 1872 was made minister of finance, in which position he brought the national finances into order and established a national currency. In 1881 he withdrew from office and organized the Progressist party, which urged that a constitutional government be immediately organized, and that the ministry be subordinated to the parliament, of which he was the recognized leader during his political career. After the Japanese parliament was established, he became minister of foreign affairs, but his liberal attitude toward the revision of the treaties with foreign countries aroused so much popular opposition that he retired from office. In 1896 he was for a short time in the cabinet, and in 1898 organized a cabinet of which he was premier, but resigned within a few months and retired from public life. After his withdrawal from office in 1881, he founded the Semmon-Galko, a school for the study of law, literature, and political economy. In 1907 he resigned leadership of the Progressive Party. He advocates higher education of women.

**Olaf, ô'lâf, Saint**, Norwegian king: b. 995; d. Sticklestad, Norway, 1030. He was a great-

grandson of Harald Haarfager, a son of Harald, chief of the district of Gränland, and early made himself famous by his military expeditions to England, successfully assisting King Ethelred against the incursions of the Danes. After the death of Eric and the expulsion of his son, Olaf caused himself to be proclaimed king. He began his reign by introducing a special court of law called the Hirdskra, and restored the ancient boundaries of Norway and Sweden, but above all was a zealous supporter of Christianity and may indeed be called the real converter of Norway. The severity which he employed for this purpose afterward exposed him to a formidable retaliation at the hands of his own subjects. Having engaged in war with Canute the Great, king of England, he allied himself with King James of Sweden, but was so completely defeated in battle that he fled to Sweden and Russia. In 1028 he was induced by a dream to return to Norway, where he found the people so alienated from him that he could only bring 3,000 men into the field to oppose the forces of the mighty Canute. The armies met at Sticklestad, near Drontheim, in 1030, and Olaf lost both the battle and his life. His body was buried in the cathedral of Drontheim, and he has since 1164 been honored as the patron saint of Norway. Many legends respecting him are current throughout the North, and his name has been given to an order of knighthood founded by King Oscar I. in 1841 as a reward for services to king and country, art and science. Consult Longfellow's poem, 'The Saga of King Olaf' (1863). His feast day is 29 July.

**Olathe, ô-lâ'thê, Kan.**, city, county-seat of Johnson County; on the Atchison, T. & S. F., the St. Louis & S. F., and the Missouri, K. & T. R.R.'s; about 23 miles southwest of Kansas City. It is in an agricultural and stock-raising region. The chief manufactures are flour, furniture, shoes, brick, and agricultural implements. The State institution for the Deaf and Dumb is located here. The city owns and operates the waterworks. Pop. (1910) 3,272.

**Olcott, Henry Steel**, American theosophist: b. Orange, N. J., 2 Aug. 1832; d. Adyar, India, 17 Feb. 1907. He was educated in the University of the City of New York and in 1858-60 was agricultural editor of the New York *Tribune*. In 1863-6 he was special commissioner in the United States War and Navy departments and was admitted to the bar in 1866. He was one of the founders in 1875 of the New York Theosophical Society, and was its president; he edited the magazine 'Theosophist' 1879-1907, and in recognition of his services to Hindu philosophy received the unique honor of the sacred thread of the Brahman caste. He published 'Sorgho and Umphee' (1857); 'People from the Other World' (1875); 'The Buddhist Catechism' (1882); 'Old Diary Leaves' (1895-1903); etc.

**Old Abe**, a nickname applied to Abraham Lincoln.

**Old Age, Diseases of.** The advent of age and the decline from the prime of life are characterized by certain physiological conditions which are due to pathological changes resulting from senility. These conditions may be reached in middle life, and are then premature. They may be postponed till the subject has reached a great age, and he may pass away without evi-

## OLD AGE PENSIONS — OLD CATHOLICS

dence to the lay eye of their existence; but nevertheless they are present, and age itself is never a cause of death. Arteriosclerosis (see ARTERIES, DISEASES OF) is probably present in every case of old age. The senile kidney is very frequently a cause of death. Its tissues are altered, and its power to perform its functions is much diminished. It becomes accustomed to eliminating the decreased excretory substances which result from a generally lowered vitality, but it is unable to perform the added labor demanded during an attack of indigestion or of an ailment accompanied by fever. Bronchitis is frequent in the aged, and when prolonged is followed by emphysema. Chronic pneumonia is frequently found in the aged lung at necropsy. During digestive disorders or infective diseases of the urinary tract (commonly cystitis) fever frequently arises, and in such an event respiratory failure is prompt and dangerous. The aged heart fails to contract completely during systole, owing to weakness of its muscle, and circulatory disturbances result. In the aged death often occurs with the heart in the condition of asystole. The nerves functionate with diminished power. General sensibility for heat, cold, touch, and pain is lessened, and all the special senses, hearing, smelling, tasting, and seeing, are impaired. Muscular decay and increasing fragility of the bones invite accidents, and old persons sustain frequent fractures of bones. The fragments in these cases do not unite speedily, and often fail to knit at all. Aged patients bear very badly the enforced quiet necessary during repair of fracture of the thigh-bone, a common accident with such. They suffer at once from loss of sleep, impairment of appetite, marked muscular atrophy, and derangement of digestive and urinary organs. The perils that accompany these conditions are often seriously complicated by hypostatic pneumonia. The aged are unusually prone to attacks of gout and rheumatism, and these diseases are fairly intractable. They are also very susceptible to the infection of erysipelas. Attacks of gripe are accompanied with marked prostration, alarming organic weakness, and frequent heart-failure. While the bronchial and pulmonary implication in gripe in the aged is less severe, it is apt to remain. Typhoid fever of irregular type and with insidious invasion is a common cause of death in those of advanced age. Cancer of stomach or intestine is not uncommon. Arteriosclerosis, already mentioned, leads to rupture of arteries, and apoplexy from cerebral hemorrhage is not infrequent. As a lesion of gout, chronic endarteritis occurs in many instances with secondary cerebral softening.

The treatment of the diseased conditions of old age does not differ in many respects from that in younger subjects, except that supportive measures are more essential. Resistive power and recuperative effort are naturally much diminished, and the decreased functioning power of all organs must be considered. Much can be done to prevent the early approach of age. Probably the use of alcoholic beverages is the most frequent and potent cause. Alcohol should be avoided at every age. Moderate eating, especially after middle age has been reached; avoidance of sudden or violent physical exertion after the age of 60; avoiding stress and strain, bodily or mental; limiting emotional outbursts, espe-

cially those of anger and grief; wearing suitable clothing, adjusted to climatic conditions; and leading an out-of-door life, guarding against exposure—these are precautions which may baffle the advance of old age for many years.

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**Old Age Pensions.** See PENSIONS.

**Old Bailey,** London, England, a historic criminal court, prior to 1903 adjoining Newgate Prison, between Holborn Viaduct and Ludgate Hill, where now stands the Central Criminal Court. In the Old Bailey the surviving judges of Charles I. were tried after the Restoration, in 1660, and it witnessed also the trials of the patriot Lord William Russell in 1683, Jack Sheppard in 1724, Jonathan Wild in 1725, the poet Savage in 1727, Dr. Dodd in 1777, Bellingham, the assassin of the statesman Perceval, in 1812, the Cato Street conspirators in 1820.

**Old Bay State,** a name given to Massachusetts, whose shores are washed by Cape Cod Bay. Prior to the adoption of the United States Constitution Massachusetts was known as "the Colony of Massachusetts Bay."

**Old Bullion,** a name familiarly applied to Thomas Hart Benton (q.v.) because of his persistent defense of gold and silver currency.

**Old Castile.** See NEW CASTILE.

**Old Catholics,** religious denominations formed by certain seceding Roman Catholics in 1870, whose basis of belief and practice was declared to be the revival of the traditions of the Apostolic Church and the recognition, as authoritative, of the first seven œcumenical councils of the Church and none others.

*The Cause of the Revolt.*—An œcumenical council, commonly known as the Vatican, was convened at Rome and assembled 8 Dec. 1869, which included 49 cardinals, 9 patriarchs of the Eastern Church, 4 primates, 121 archbishops, 479 bishops, and 52 abbots and other monastic dignitaries. On 15 Jan. 1870 the number present had increased to 744, and by March to 764. When the object of the council was made known, the definition of papal infallibility, a protest was made, outside the council, by Dr. Dollinger, the most illustrious scholar of Roman Catholic Germany, supported by the French Minister Darn and the Austrian Von Buesh and a small party of bishops. Nevertheless the dogma was at length promulgated and received the assent of the Roman Catholic hierarchy throughout the world. Its terms were as follows:

"We teach and define . . . that the Roman pontiff, when he speaks *ex cathedra*, that is, when in discharge of his office of Pastor and Doctor of all Christians he defines, in virtue of his supreme apostolic authority, a doctrine of faith or morals to be held by the Universal Church, is endowed with the divine assistance promised to him in Blessed Peter, with that infallibility with which our divine Redeemer willed that the Church should be furnished in defining doctrine of faith or morals, and, therefore, that such definitions of the Roman pontiff are irreformable of themselves and not in virtue of the consent of the Church." This dogma was promulgated 18 July 1870.

The universities of Germany alone opposed

## OLD COLONY—OLD GLORY

the new Vatican decree. Dr. Von Schulte, professor at Prague, was first to utter a written protest. At Nuremberg a vote of dissent was passed by a meeting of Roman Catholic professors and scholars in August 1870. "Father Hyacinthe" (M. Charles Loyson) issued his 'Appel aux Evêques Catholiques' denying that the decree was binding on the Church. The learned Dr. Döllinger set forth in a letter his reason for dissent as "a Christian, a theologian, an historical student, and a citizen." His excommunication was immediately proclaimed from all the pulpits of Munich. He was, however, supported by the professors of the University, and an address to the king, written in the same spirit of protest, received 12,000 Roman Catholic signatures. Finally an assembly of the dissentients was held at Munich the following September and was attended by 500 delegates from all quarters of Europe. The lectures of Reinkens delivered in 1871 made the issues plain to the world, and his arguments were echoed and enforced in the inaugural address delivered by Dr. Döllinger as rector of the University of Munich.

**Constitution of the Old Catholic Church.**—The movement gradually gained such momentum that organized action was forced upon its supporters. On 4 June 1873 Dr. Reinkens was consecrated their bishop at Rotterdam by the Jansenist Bishop Heydekamp of Deventer and, as the cause was spreading rapidly in Switzerland, a congress was held there and was attended by both English and American theologians (12-14 September). The election of Bishop Reinkens was recognized by the German government, and in the following year a synod and conference were held at Bonn. The results of these discussions were embodied in canons by which the clergy were allowed to marry, compulsory fasting and confessions were abolished, the vernacular was ordered to be used in public worship, and it was made permissible in the churches to administer the communion in both kinds to Anglicans. In Switzerland the Old Catholics, or as they there preferred to style themselves, Christian Catholics, chose Professor Herzog for their bishop and he was duly consecrated by Bishop Reinkens 18 Sept. 1876. The University of Bern elected an Old Catholic faculty and in 1890 there were 55 congregations under Bishop Herzog with some 50,000 lay members and 72 ministering clergymen. In Austria the Old Catholics organized themselves in 1888 and in 1900 were reported to number 16,000 souls. In France a Gallican Old Catholic movement was set on foot by Père Hyacinthe under the jurisdiction of the Arminian archbishop of Utrecht. The Old Catholics in Italy were led by Count Campello, those in Spain by Cabrera and in 1890 and 1892 there was an enthusiastic international Congress of Old Catholics in which the progress of the movement was said to show a marked advance. On the death of Bishop Reinkens in 1896, Vicar-General Theodor Weber was elected to take his place and consecrated in Bonn with a jurisdiction extending over the whole German Empire. In this large diocese, the whole of Germany, the Old Catholics number 61 priests (four of them retired and two holding professorates), and from 45,000 to 50,000 lay members; and are building

numberless churches, parsonages, and seminaries. At Bonn and Essen they have founded hospitals and poorhouses. The Church has several organs, the chief of which are 'Deutscher Merkur,' published at Munich since 1870 and at Bonn since 1899; 'Alt-Katholisches Kirchenblatt,' founded in 1874. In Holland it is represented by 'Oud Katholik'; in Italy by 'Il Labaro'; in Spain by 'La Luz.' Its quarterly review of theology (a scientific and learned volume of essays and notes) is the 'Internationale Theologische Zeitschrift,' founded in 1893.

Consult: Goetz, 'Die geschichtliche Stellung und Ausgabe des deutschen Alt-Katholicismus' (1896); Mayor, 'Facts and Documents' (1875); and Mullinger ('Theodorus'), 'The New Reformation.'

**Old Colony,** a name applied to the south-east part of Massachusetts, the section occupied by the Plymouth Colony, and later given to the State.

**Old Curiosity Shop,** a novel by Charles Dickens which first appeared by weekly instalments in 'Master Humphrey's Clock' 1840-1. Little Nell, Dick Swiveller, Quilp, and The Marchioness are prominent members of the *dramatis personæ*.

**Old Dominion,** a name given to Virginia. In the original charters pertaining to the lands of Virginia, it was frequently called 'the colony and dominion of Virginia.' Massachusetts was given the name "Old Colony," and Virginia "Old Dominion."

**Old-field Lark,** a local name in the Southern States for the meadow-lark (q.v.).

**Old Folks at Home,** a famous Southern plantation song, written in 1850 by Stephen C. Foster (q.v.). The song realized some \$15,000 for the author.

**Old Forge, Pa.,** borough in Lackawanna County; on the Lackawanna River, and on the Lehigh Valley, the New York, S. & W., and the Delaware, L. & W. R.R.'s; about five miles southwest of Scranton. It was settled in 1830 and remained a part of the Old Forge township until 1899, when it was incorporated as a borough. It is in the anthracite coal region; a large number of the men and boys of the borough are engaged in coal-mining. The chief industries beside the mining and shipping of coal are glass-blowing, manufacturing silk goods, and making chemicals and fertilizers. It has a fine high school building and good grade schools. The government is administered by a burgess, who holds office three years, a borough council, and subordinate officials. Pop. (1910) 11,324.

**Old Glory,** a popular name for the flag of the United States. It was first applied in 1831 by William Driver, a sailing captain of Salem, Mass., who died at Nashville, Tenn., in 1886. Previous to the outbreak of hostilities between the North and South "Old Glory" was flung to the breeze every day from the window of Captain Driver's Nashville house, but when the conflict began the old flag had to be secreted. It was kept out of sight till General Nelson's wing of the Union army appeared in Nashville 27 Feb. 1862, when Captain Driver presented it to the general to be hoisted on the Capitol. It was run up, and Captain Driver himself did the hoisting. Its name and history soon became

## OLD GRIMES — OLD RED SANDSTONE

familiar to all the soldiers in General Nelson's command.

**Old Grimes**, the hero of a popular humorous American ballad and song, by Albert Gorton Greene (q.v.). The title is an adaptation from one of the metrical tales by George Crabbe, but the personage described in the ballad is an exaggerated study of an eccentric New Englander who flourished in the earlier half of the 19th century.

**Old Guard, The**, a popular name applied to a body of French troops in the army of Napoleon I. The Guard consisted of five regiments; was distinguished for bravery, and at the battle of Waterloo made the final charge of the French army.

**Old Hickory**, an affectionate nickname given to Andrew Jackson (q.v.) by his militia troops, on account of his toughness and endurance of hardship. It seems to have been first conferred on occasion of his march back from Natchez in February 1813, when, after having sent him there to foil an expected British attempt on New Orleans, Secretary Armstrong ordered him to disband his men. Jackson in great wrath marched them home in a body, undergoing great discomforts on the way.

**Old Hundred**, a popular religious hymn tune adopted from a 15th century melody. The tune is found in the Flemish Psalter (1540) and in the Dutch Psalter (1561). In England it was originally sung to the 100th Psalm. Consult Fitzgerald, 'Stories of Famous Songs' (1897).

**Old Ironsides**, a name applied to the United States frigate Constitution (q.v.).

**Old Kentucky Home**, a famous plantation song, written and set to music by Stephen Collins Foster, in 1850.

**Old Line State**, a popular name for the State of Maryland, which in the early colonial days was the dividing line between the Crown land grants of William Penn and Lord Baltimore.

**Old Man; Old Woman**, ornamental and culinary herbs. See ARTEMISIA.

**Old Man of the Mountain**, a name given to a huge rock on Profile Mountain, in the Franconia Range, N. H. When viewed from certain positions it bears a marked resemblance to a man's face. The name is sometimes given to Profile Mountain.

**Old Man of the Mountain**. See MOHAMMEDANISM.

**Old Man of the Sea**, (1) frequently in Greek poetry, an epithet applied to Nereus. (2) In the 'Odyssey,' an epithet also of a sea-deity, Phorcys, or Phorcus. (3) In the 5th voyage of 'Sinbad the Sailor' in the 'Arabian Nights' Entertainments, an old man, who, under pretense of being carried by Sinbad across a brook, fastened himself upon the latter's back and could not be dislodged. Sinbad finally made him intoxicated, threw him upon the ground, and broke his head with a stone. In a derived sense, the expression is often used of a bore, or of a burden that cannot be escaped.

**Old Mortality**, a novel by Sir Walter Scott published in 1816. It deals with the struggle between the Covenanters and the forces of the crown under Claverhouse (see GRAHAM,

JOHN, VISCOUNT DUNDEE), about 1670. The title is the nickname given to Robert Paterson (q.v.), who bestowed years of care upon the gravestones of Covenanters.

**Old Nick**, popular sobriquet of the Devil, derived both from Saint Nicholas (Ger. Nicolaus, diminutive Nickel, often used of the Devil) and from Nekker (or Nikker), a Teutonic water-sprite whose appearance to sailors foreboded death and drowning. Old Harry, Old One, Old Scratch are other names similarly used.

**Old North State, The**, a name sometimes given to North Carolina.

**Old Oaken Bucket, The**, a poem by Samuel Woodworth (q.v.), an American poet, written in 1817 and first published as 'The Bucket.' The air to which it is set is an adaptation of the music of Moore's song 'Araby's Daughter.'

**Old Orchard, Maine**, town in York County; on the Atlantic Ocean, and on the Boston & Maine railroad; about 10 miles southwest of Portland. It is a famous summer resort, on account of its smooth ocean beach 12 miles long, where surf bathing is safe, and there are good opportunities for fishing. Deep-sea fishing is a favorite sport, but those who prefer still-water fishing go to Biddeford Pond nearby. The Methodist camp-meeting grounds are visited annually by a large number. Thirty-one years (1903) of evangelistic work is claimed for Old Orchard. It is becoming a summer convention place. In 1903 conventions were held here under the auspices of the Christian Workers' League, the Christian Alliance, and the Woman's Christian Temperance Union. There were held also in the month of August the same year, a Musical Festival, a White Cross Convention, and a Methodist Convention. The population is several thousand in the summer months, but the regular residents number about 1,000.

**Old Point Comfort, Va.**, a famous watering place in Elizabeth City County; on the point of a small peninsula where Chesapeake Bay and Hampton Roads enter the Atlantic Ocean. It is near Fort Monroe and about five miles north of Norfolk. The climate is equable, the opportunities for bathing, fishing, and boating are excellent; the garrison at the Fort, and the cities of Norfolk and Portsmouth nearby all add to the attractions.

**Old Probabilities**, a popular nickname for the head director of the United States Weather Bureau; a personification of weather prophecies generally.

**Old Put**, a popular sobriquet bestowed upon the American general, Israel Putnam (q.v.).

**Old Red Sandstone**, in geology, a name loosely used by Hugh Miller (q.v.) in his 'The Old Red Sandstone' and 'Footprints of the Creator,' for the formation below the Carboniferous (q.v.); New Red Sandstone (q.v.) was by contrast used of similar strata above the Carboniferous system. Miller's books did much to draw the attention of scientists to this group of Palæozoic rocks, and the term became popular. In scientific usage it was soon ousted by 'Devonian' (q.v.), which as suggesting Devonshire the typical English locality is less misleading than Old Red Sandstone, inasmuch as these rocks



consist of other sandstones than red, for example, white, yellow and green, and of many beds of clay and limestone. The Devonshire rocks are not sandstone but chalk; the identity or similarity of geological genesis between the rocks of Devon and Miller's Scotch sandstones was proved by the similarity of fossil remains. In America the main groups falling under the head of the Devonian or Old Red Sandstone System are those styled by the New York Geological Survey, the Catskill, Chemung, Portage, Hamilton, Marcellus, Upper Helderberg, Schoharie and Oriskany groups (qq.v.).

**Old Reliable**, in the American Civil War, a nickname applied to Gen. George H. Thomas (q.v.).

**Old Rowley**, nickname of Charles II. of England, said to have been derived from the name of one of the king's famous racehorses, whence, also, a part of the Newmarket race-course is known as "Rowley mile."

**Old Squaw**, or **Old Wife**, the long-tailed duck (*Clangula hiemalis*), a sea-duck present in the nesting season in all boreal regions, and visiting the United States in winter. It is blackish and whitish; head, neck and lower parts mostly white in winter; a patch of gray on the head; breast brownish black; bill black and orange; tail very long—a means of instant recognition of the drake. The tail of the female is short, and her plumage is mostly grayish brown. Gunners sometimes call the drake "old injun" and the female alone "old squaw"; also "south-southerly," etc. Most of the names are taken from its noisy habits, for it is almost continually calling, but its cries are musical. They are favorite with gunners more from the skill required in shooting them, on account of their swift flight and wary ways, than for excellence of flesh; they rarely present themselves for a shot except when they come into the bays and river mouths for food at sunrise, flying in long lines. They also occur on the Great Lakes.

**Old Testament**, **The**, the canonical books of the Scriptures which were composed and published before the Christian era.

**Origin and Formation**.—It is impossible to be very certain about the date of composition and the authorship of most of the books of the Old Testament, or the manner and time of bringing them together into the collection in which they now appear. Few of them contain any statement in regard to their authorship, which we can reasonably suppose to have been made by the author himself, so that, who he was, and when he lived, must, for the most part, be determined by the evidence to be found in the contents of the book itself, or by references to it contained in other Biblical books. When the formation of the collection now known as the Old Testament, began, how it was carried on, and when it was completed, are matters, no one of which can be determined with certainty. For more detailed statements on these points, see **BIBLE**, *Genesis of the Old Testament*, and *Canon of the Old Testament*.

**Ancient Versions**.—The most important Ancient Versions of the Old Testament are the Greek Versions (especially the Septuagint); the Aramaic Versions, called Targums; the Syriac Versions (especially the Peshitto); and the Latin Versions, especially the Vulgate of Jerome.

For an account of these versions, see **BIBLE**, *Versions of the Old Testament*.

**Literary Elements**.—The Old Testament cannot be correctly understood or rightly used, unless regard is given to the different literary elements, or forms of literature, which it contains. There are to be found in it books which, for want of a better term, may be called historical works, as, for example, the books of Samuel and Kings. These, however, are not histories in the modern sense of this word, but are works of religion, in which the lessons of history are used to bring men into harmony with the will of God. There are also in the Old Testament poetical works, as, for example, the Psalms and the book of Job, which exhibit all the phenomena that characterize poetry in general. We find also, in its contents, works of a practical philosophy, as, for example, the books of Proverbs and Ecclesiastes, all of which have the form, and, in some measure, the substance of poetry. Another, and a large element, of its contents is to be found in the collections of the sermons, or discourses, of the prophets, which form the main part of the prophetic books, as, for example, the books of Amos and Isaiah.

Each of these different kinds of literature has a nature and characteristics of its own, and must be interpreted, if interpreted correctly, in harmony with its own peculiar form and characteristics. This is especially true of the poetical and prophetic portions of the Old Testament, concerning which, therefore, something more in detail will follow.

**The Poetry of the Old Testament**.—Under this head, it is proposed to consider simply the form in which the poetry of the Old Testament appears, that is, the Hebrew rhythm and the Hebrew verse.

All rhythm in language is due to the repetition of certain uniform measures marked by a certain regular and recurrent stress. Thus the rhythm of the classic languages was secured by the use of poetical feet. Feet were combinations of syllables, all of which, in the same kind of verse, occupied the same time in utterance, but differed in the number of syllables composing them. In the Hebrew rhythm, the place taken by feet in the classic languages was held by sentences. Thus a Hebrew rhythm consisted of sentences of the same, or nearly the same, length, but composed, each one, of different words. As an example of this Hebrew rhythm, may be cited Psalm xviii. 2:

Jehovah is my rock, and my fortress, and my deliverer;  
My God, my rock, in whom I will take refuge;  
My shield, and the horn of my salvation, my high tower.

(All quotations and citations in this article are made from the American Revision of 1901.)

It will be seen from this example, that the equality of length in the different sentences, which is the basis of the rhythm, is secured, as would be natural, by having each sentence express the same thought, although the common idea is expressed each time by other words. To all such rhythms is given the name of Parallelism. So that we may define a Parallelism in Hebrew poetry as a combination of sentences, all of which are of the same, or nearly the same, length, and each of which expresses, in some way or other, the same idea. Each of the sentences so combined is called a Member of the Parallelism.

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Parallelisms are classified both according to the number of their members, and according to the manner in which the common idea is expressed in all the members. In the classification according to the number of members, parallelisms are either simple or compound, a simple parallelism having two members, and a compound parallelism three members. In the classification according to the manner in which the common idea is expressed, parallelisms are either synonymous, antithetic, or synthetic. A synonymous parallelism is one in which all the members express, each one, exactly the same idea, but with some change of words in each member. Such a parallelism appears in the simple parallelism of Psalm iii. 1:

Jehovah, how are mine adversaries increased!  
Many are they that rise up against me.

An antithetic parallelism, which is always a simple parallelism, is one in which the common idea is expressed in one member positively, and in the other negatively. Such a parallelism is Psalm xxv. 3:

Yea, none that wait for thee shall be put to shame:  
They shall be put to shame that deal treacherously without cause.

A synthetic parallelism is one in which the common idea is expressed in all the members in such a manner that, in each member, a different side, part, or element, of the common idea, is made prominent. Such a parallelism is the compound parallelism of Psalm xiv. 4:

Have all the workers of iniquity no knowledge,  
Who eat up my people as they eat bread,  
And call not upon Jehovah?

Hebrew verse is sometimes constructed by using parallelisms of different kinds, or even of the same kind, in a continuous succession. But very frequently, instead of thus employing successive parallelisms, stanzas are used in the making of the Hebrew verse. A stanza is a combination of parallelisms, or of parallelisms and single members, which are called, when used in this way, odd members, in which each one of these constituent elements expresses the same general thought in the way in which each one of the members of a parallelism expresses the same idea, so that these elements are related to one another synonymously, antithetically, or synthetically. It is to be noted, however, that two odd members cannot immediately succeed each other in a stanza. But it is common to use the term stanza in a more general and somewhat inaccurate sense, and thus to denote by it any one of the structural divisions of Hebrew verse, whether the portion so indicated is really a stanza as defined above, or only a parallelism. In this sense of the term, it is both correct and necessary to say that, in our present editions of the Old Testament Scriptures, except in those cases in which the Masoretic division and accentuation of the Hebrew text are to be rejected as not correctly indicating the real structure of the verse, each Scripture verse in the poetical books and passages is a stanza. Among the different forms of the true stanza occurring in the Old Testament, we find stanzas consisting of two parallelisms, as, for example, Isaiah i. 3:

The ox knoweth his owner,  
And the ass his master's crib;  
But Israel doth not know,  
My people doth not consider.

We find also stanzas of this kind which are so arranged, that the two first members of the parallelisms immediately follow each other, and then the two second members follow each other in immediate succession, as, for example, Deuteronomy xxii. 42:

I will make mine arrows drunk with blood,  
And my sword shall devour flesh;  
With the blood of the slain and the captives,  
From the head of the leaders of the enemy.

The real meaning here is:

I will make mine arrows drunk with blood,  
With the blood of the slain and the captives;  
And my sword shall devour flesh  
From the head of the leaders of the enemy.

We also find stanzas consisting of two parallelisms and one odd member, as, for example, Hosea xiv. 9:

Who is wise, that he may understand these things?  
Prudent, that he may know them?  
For the ways of Jehovah are right,  
And the just shall walk in them;  
But the transgressors shall fall therein.

Other forms of the stanza also occur, which it is not necessary to specify in this place.

In addition to the rhythm of sentences which has now been described, the Hebrew verse has, according to some scholars, an accentual rhythm. Those who adopt this view, assert that every poem, or each portion of a poem, in which the rhythm remains the same, has the same number of accents in each member of every parallelism. It is, however, claimed that an irregular number of accents may occasionally occur in a member, especially if force or energy of thought is thus secured, just as irregular feet and lines are sometimes allowed in the classic poetry. The most weighty objection to this theory is the fact that, while it is, of necessity, founded upon the Masoretic accentuation of the Hebrew text, as this now exists, it requires frequent and considerable arbitrary changes of this accentuation in order to make the number of the accents conform to its claims. But it is not safe to accept as valid and sufficient the testimony of a witness who is in the next moment to be declared untrustworthy. It would seem better to think that the equality in the number of accents so often to be seen in the different members of a parallelism in the Hebrew text of the poetical portions of the Old Testament, is a coincidence due to the equality of length and the sameness of the thought in these members.

Some scholars have thought that, in addition to its rhythm of sentences, the Hebrew verse possesses a rhythm of quantity, and has, therefore, feet and metre in the same manner as the Greek and Latin verse. Various theories have been proposed in relation to this matter; but no one of them has yet been established in such a way as to meet with general acceptance among scholars. It is not too much to say that it is still a matter of doubt whether or not the Hebrew verse possesses a rhythm of quantity.

In some Hebrew verse, the stanzas are so combined as to form strophes. These are combinations of stanzas, including parallelisms used as stanzas, which are so constructed that each combination contains the same, or nearly the same, number of members, and forms the expression of a natural and important division of the thought of the poem. More frequently, when a poem has the strophic form, strophes constructed according to different standards

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appear in it. But, in all such cases, the combination of the different kinds of strophes is made according to some definite plan and some mathematical law. Such a composite strophic structure may be seen in Psalm lvii., in which there are six strophes. The number of members in each of these strophes, and the plan according to which they are arranged, may be indicated by a line of figures, called a strophic scheme, in the following way: 4-5-6-4-5-6. The first strophe is a call for help, verse 1:

Be merciful unto me, O God, be merciful unto me;  
For my soul taketh refuge in thee:  
Yea, in the shadow of thy wings will I take refuge,  
Until these calamities be overpast.

The second strophe is an expression of confidence that God will give the desired help, verses 2 and 3:

I will cry unto God Most High,  
Unto God that performeth all things for me.  
He will send from heaven, and save me,  
When he that would swallow me up reproacheth;  
God will send forth his lovingkindness and truth.

The third strophe sets forth the great need of help, verses 4 and 5:

My soul is among lions;  
I lie among them that are set on fire:  
Even the sons of men, whose teeth are spears and arrows,  
And their tongue a sharp sword.  
Be thou exalted, O God, above the heavens;  
Let thy glory be above all the earth.

The fourth strophe sets forth the coming overthrow of the enemies of the poet, verse 6:

They have prepared a net for my steps;  
My soul is bowed down:  
They have digged a pit before me;  
They are fallen into the midst thereof themselves.

The fifth strophe is an expression of gratitude to God for the help and deliverance which are surely to be given, verses 7 and 8:

My heart is fixed, O God, my heart is fixed:  
I will sing, yea, I will sing praises.  
Awake up, my glory;  
Awake psaltery and harp:  
I myself will awake right early.

The sixth strophe expresses the writer's joy because he can be sure of the goodness and faithfulness of God, verses 9-11:

I will give thanks unto thee, O Lord, among the peoples;  
I will sing praises unto thee among the nations.  
For thy lovingkindness is great unto the heavens,  
And thy truth unto the skies.  
Be thou exalted, O God, above the heavens;  
Let thy glory be above all the earth.

Some writers use the term strophes, in speaking of Hebrew verse, to denote any portions of a poem which express natural divisions of its thought, without any regard to the number of the members contained in these portions of the verse. But such a use of the term seems to be faulty. For it means but little when so used, since almost every poem is strophic in this sense. Moreover, in such a use of the term, no sufficient account is made of the fact that there are some poems constructed, as already indicated, according to definite mathematical plans.

Some Hebrew verse has a choral form. That is, it consists of divisions intended to be sung responsively by different persons, either choirs or individuals. Such verse appears in Psalm xxiv., which seems to have been composed to be sung, or as if to be sung, at the removal of the ark by David from the house of Obed-edom to the fortress on Mount Zion. In this psalm, the choral structure seems to be the following:

*(The full choir, as the procession moves up the hill, verses 1 and 2)*

The earth is Jehovah's, and the fulness thereof;  
The world, and they that dwell therein,  
For he hath founded it upon the seas,  
And established it upon the floods.

*(A single voice, or a part of the choir, asks, verse 3)*

Who shall ascend into the hill of Jehovah?  
And who shall stand in his holy place?

*(A part of the choir replies, verses 4 and 5)*

He that hath clean hands, and a pure heart;  
Who hath not lifted up his soul unto falsehood,  
And hath not sworn deceitfully.  
He shall receive a blessing from Jehovah,  
And righteousness from the God of his salvation.

*(The full choir sings, verse 6)*

This the generation of them that seek after him,  
That seek thy face, even Jacob.

*(The full choir before the gate of the fortress, verse 7)*

Lift up your heads, O ye gates;  
And be ye lifted up, ye everlasting doors:  
And the King of glory will come in.

*(A single voice, or a few singers, in the fortress, verse 8, a.)*

Who is the King of glory?

*(The full choir without the fortress, verses 8, b and 9.)*

Jehovah strong and mighty,  
Jehovah mighty in battle.  
Lift up your heads, O ye gates,  
Yea, lift them up, ye everlasting doors:  
And the King of glory will come in.

*(A single voice, or a few singers, in the fortress, verse 10, a.)*

Who is this King of glory?

*(The full choir without the fortress, verse 10, b.)*

Jehovah of hosts,  
He is the King of glory.

*Prophecy in the Old Testament.*—In treating of Hebrew verse, we have described the one thing which is peculiar in the Old Testament in the matter of literary form. In the prophetic discourses, or sermons, of the Old Testament, we find the one thing which separates it as a book of religion from all other literature. The essential and distinguishing thing about the sermons and writings of the prophets was, that they were messages received directly from God, which were to be given to the men of the prophet's time for the purpose of changing, in some way or other, existing conditions in the national life. Hence, the prophetic discourses were always occasioned by a definite and actually existing historical situation. By them, the prophet sought to accomplish some result in the life and conduct of his hearers. Therefore, the motives he urged, and the truths he presented, were those naturally suited to secure the desired result. If he made predictions, he did so for the same reason that now causes preachers and ethical teachers to predict, that is, to show what consequences would follow certain lines of conduct in order to incite men to, or dissuade men from, some particular way of living. Prediction, therefore, was merely incidental, and not at all essential, to prophecy. Moreover, since the constant aim of the prophet was to secure some desired spiritual condition on the part of his hearers, and much that was predicted by the prophets, was only to come to pass in the future in consequence of the existence of this

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desired spiritual condition, it follows that there was a very large conditional element present in all the predictions of the Old Testament prophets. The desired condition was not always in existence at the time to which the prediction related, and, consequently, there is much predictive prophecy which, so far at least as the letter of the prediction is concerned, has not yet been fulfilled, and cannot now ever be fulfilled. The Hebrew prophet was a preacher, and not a soothsayer, or a fortune-teller.

This fundamental law of prophecy is clearly set forth by the prophet Jeremiah, speaking in the name of Jehovah, in chapter xviii., verses 7-10, of his book. The word of Jehovah to him was:

At what instant I shall speak concerning a nation, and concerning a kingdom, to pluck up and to break down and to destroy it; if that nation, concerning which I have spoken, turn from their evil, I will repent of the evil that I thought to do unto them. And at what instant I shall speak concerning a nation, and concerning a kingdom, to build and to plant it; if they do that which is evil in my sight, that they obey not my voice, then I will repent of the good, wherewith I said I would benefit them.

We may see an illustration of the working of this law in the case of the apparently positive and unconditional declaration of the prophet Jonah in regard to the fate of Nineveh. "Yet forty days," the prophet proclaimed, "and Nineveh shall be overthrown." But it was not overthrown; for

"they turned from their evil way; and God repented of the evil which he said he would do unto them; and he did it not."

We find also a progressive element in the Old Testament prophecies. The same progressive character appears in this part of the divine revelation as is to be seen in revelation as a whole. The later prophets often presented some great fact in a higher and more complete way than those who had preceded them. If, for example, we study Psalm cx. and Isaiah ii. 2-4, in connection with each other, we shall find that they both present to us the fact that Jehovah, either in His own person, or in the person of the Messianic King, who shares His throne, and represents His authority, is to be the acknowledged lord and sovereign of the nations. But the two passages do not represent this fact as coming to pass in the same way. The first passage, Psalm cx. declares that this fact will come to be, because Jehovah will, in His wrath, by the exercise of His might, make the enemies of His appointed king a footstool for his feet, while the passage in Isaiah presents to us this same fact as resulting from the joyful submission of the nations to the rule of Jehovah on account of the high estimation which they will put upon His law. These two views are not necessarily mutually exclusive, or even inconsistent with each other; but the latter may reasonably be regarded as presenting the higher and more spiritual side of the one great fact.

The same progressive element may be noticed in those predictive passages which relate still more directly to the work of the Messiah. In the earlier days of Israel's history, when the kingdom was still in a more or less flourishing condition, the Messiah was generally presented, in the preaching of the prophets, as a great and victorious king. But, in the discourses of the prophets of the exile and the post-exilic period, the most common representation is that the

Messiah will accomplish His work of salvation through humiliation and suffering. This, however, does not mean that the ideas relating to the character and work of the Messiah to be found in the writings of the prophets, were a natural growth, springing from the national consciousness in a purely human way, under the stimulation of the varying hopes and fears of the national history. They were not the less truths received from God, because, in giving them to men, He had regard to the ability of men to receive them. They did not cease to be revelation, because they were revealed according to a national receptivity conditioned by national circumstances.

Another element which appears not infrequently in the prophetic writings, is due to the fact that the prophets were often poets, and, like all poets, they set forth purely ideal creations of the imagination. Hence, we find sometimes in the prophetic predictions an ideal element, which could not have been expected by the prophet ever to be realized in actual experience or history. For example, it is clear that the prophet who spoke or wrote the words contained in Isaiah lii. 7-10, intended to predict that Jehovah would cause the city of Jerusalem to be rebuilt, and would bring back the exiles of Judah to their own land. In making this prediction, however, he tells us that a welcome messenger will be seen upon the hills near Jerusalem, bringing to the ruins of the city, and to some mysterious beings who will be seen watching over these ruins, the news of the speedy return of the people and the future rebuilding of the city. When these watchmen shall see Jehovah bringing back the nation to its own land, they will, the prophet declares, gaze into one another's face with gladness, and raise a song of joy. But we know from the account of the return from the Babylonian exile contained in the books of Ezra and Nehemiah, and also because of the natural possibilities of the case, that these events which are foretold in verses 7 and 8 of the passage in question, never actually occurred, and, indeed, never could have occurred. These events were, therefore, only creations of the prophet's imagination, ideal additions of a poetic nature to the facts of the case.

*Old Testament Theology.*—The teachings of the Hebrew prophets which are to be found in the Old Testament, and the other teachings of inspired men, which it contains, form the material from which is constructed the science of Old Testament theology. This science is a history as well as a science, and may be termed a historical science. The method of investigation and determination employed in it is the historic, but the results obtained by the historic method are classified according to their scientific theological relations. We may, therefore, define Old Testament theology as the science which consists of the inspired statements and teachings of the Old Testament that set forth facts and doctrines of revealed religion, classified according to their scientific theological relations, and presented so as to show their historic succession. Its aim is to show the progress of revelation by determining what inspired ideas and teachings belonged to its successive stages. This it does by exhibiting in their historic succession the religious ideas and teachings of each of the in-

spired authors and teachers of the Old Testament, and by showing what ideas of this kind belonged to each epoch in the nation's history. The definition, of course, assumes that there is a revealed religion, the facts of which are supernatural, and the truths of which have been made known to men by God. It also assumes that the Old Testament consists of inspired writings in which facts and truths of this kind are authoritatively and correctly stated by men who wrote and spoke as they were moved by the Spirit of God. It is necessary, therefore, according to this definition, to distinguish between Old Testament theology, and the history of the religion of Israel. The former is the history of revelation, the latter the history of religion. The former sets forth the things which were given to men from God, as the things they ought to believe and do; the latter tells us what were the religious beliefs and practices of the whole nation, in which beliefs and practices there was much, throughout the whole Old Testament age, which was common both to the Hebrew people and the other nations of the Semitic race. Even if all inspiration should be denied to the Old Testament writings, it would still be necessary to make this distinction between the history of the religion of Israel and Old Testament theology, in order to be scientifically accurate. For it would still be true that there is a great and striking difference between the religion of the great teachers of the nation, and the religion of the nation itself; and a scientific account of the religious faith and life of the people could not ignore this fact, or treat it as of little account.

As a historical science, Old Testament theology will depend, for the form in which its material will be arranged, upon the dates which may be assigned to the writings from which this material is derived. Even though this material remains absolutely unchanged in substance, yet each new theory about the dates of the books of the Old Testament will produce a new Old Testament theology. What any particular work on Old Testament theology shall be, will be determined in no small degree by the conclusions previously made by its author in the department of higher criticism. It is for this reason that no attempt is made in this article to present any particular scheme of Old Testament theology. It seems better, for the present, to indicate the true nature of the science, and to show how the final construction of it must be made, when at last this shall be possible. The religious teachings of each of the Old Testament books will naturally be given in the various articles relating to these books. The time has not yet come for constructing, from this material, a final Old Testament theology. When the dates of the Old Testament books and the order of events in the history of Israel have been finally determined, it will be possible to construct a final Old Testament theology by employing either one of two methods, each of which has its advantages and its disadvantages. One of these methods, which may be called the scientific method, gives special prominence to the scientific theological relations of the material. Taking, in their scientific order, each of the doctrines presented in the Old Testament, it sets forth the form in which this doctrine was taught in each of the different periods of

the nation's history, and, so far as may seem desirable, in each of the books and writings of this period. The great advantage of this method is that it secures a clear view of the historical succession of the teaching in the case of each particular doctrine; but the principal disadvantage of using it is that we do not obtain by it a good idea of the whole body of the doctrines taught in any one period, or by any individual teacher. The other method, which may be called the historical method, gives special prominence to the historical relations of the material. It first determines what were all the religious teachings of each period of the nation's history, and, so far as may seem desirable, of each book and document produced in this period. Then it distributes these teachings into groups according to their scientific theological relations. The chief advantage of this method is that, by it, there is secured a clear view of the whole body of the teaching set forth in any particular period, or by any individual teacher; but its great disadvantage lies in the fact that it does not make very evident what was the historical succession of the teaching in the case of any particular doctrine.

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gate University.

Oldcastle, old'kas-l, SIR JOHN, LORD COBHAM, English nobleman: b. Herefordshire in the 14th century; d. London 25 Dec. 1417. He obtained his peerage by marrying the granddaughter of Lord Cobham. A zealous adherent of

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**Wickliffe**, he collected and transcribed his works and distributed them among the people. In the reign of Henry IV., at the head of an English army in France, he obliged the Duke of Orleans to raise the siege of Paris. Under Henry V. he was accused of heresy, and not being able to satisfy his accusers he was condemned as a heretic, and committed to the Tower, but escaped. It was then reported to the king that 20,000 Lollards were to assemble at St. Giles' for his destruction, with Lord Cobham at their head. This accusation seems to have been credited by Henry, and there certainly was an abortive attempt at a Lollard rising, with which Oldcastle was probably connected. He avoided capture for a time, but at last was taken, and as a convicted heretic and traitor was "hung and burnt" in St. Giles' Fields. In later days he was represented as "the blessed martyr Lord Cobham," though, on the other hand, he figured as the boon companion of young Prince Henry, a roysterer and a coward. Hence his name was originally adopted by Shakespeare in his 'Henry IV.' instead of that of Falstaff. The old play of Sir John Oldcastle (1600) adopts the favorable view of his character.

**Oldenburg, Henry**, ö'l'dën-bërg (Ger. ö'l'dën-boorg), German writer and courtier: b. Bremen, Germany, about 1615; d. Greenwich, England, September 1677. He was graduated from the Gymnasium Illustre, Bremen, in 1639; sent as consul for Bremen to London and served in that capacity during the "Long Parliament" and Cromwell's Protectorate, and in addition to his diplomatic duties devoted much time to literature. He was one of the first members of the society organized in 1660 which later became the Royal Society and was a friend of Milton, Spinoza, Bayle, and many other leaders in the world of learning. He edited the 'Transactions' of the Royal Society (1664-77) and published numerous translations. Among them are: 'A Genuine Explication of the Book of the Revelation,' by A. B. Piganus (1671); 'The Life of the Duchess Mazarine'; etc.

**Oldenburg, Germany**, (1) a town, capital of the grand-duchy of the same name, 24 miles northwest of Bremen, on the Hunte, which here receives the Haaren, and forms a harbor. It has fine promenades on the site of the old fortifications, two grand-ducal palaces or residences, one of them containing a library of over 50,000 volumes; a handsome grand-ducal picture gallery; a modern town-house; a public library of about 110,000 volumes; a museum of Germanic and other antiquities, fine theatre, railway-station, gymnasium, commercial school, etc. There are manufactures of tobacco, glass, leather, soap, earthenware, musical instruments, etc., and important horse-markets. Pop. (1900) 26,635. (2) The grand-duchy of Oldenburg, comprising the duchy of Oldenburg, and the principalities of Birkenfeld and Lübeck, has an aggregate area of 2,479 square miles. It borders on the North Sea, and is surrounded east, south, and west by Hanover. In the Diet or Reichstag of the German Empire the duchy is represented by three deputies, and in the Bundesrath or Federal Council by one member. The ducal house of Oldenburg dates from the commencement of the 12th century, and among its branches are the kingly houses of Denmark and Greece. Pop. about 325,000.

**Oldfield**, old'fēld, **Anne**, English actress: b. London, England, 1683; d. there 23 Oct. 1730. Her dramatic powers attracted the attention of Farquhar, the dramatist, and through his influence she made her appearance at Drury Lane. She soon overcame adverse criticism and rapidly rose to be the leading actress of her day. Her preference was for rôles in plays of the "genteel comedy" order, but when finally persuaded to take tragic parts she is said to have startled even her fellow actors by her power. Though received in the highest social circles her private life furnished ground for censure as she openly lived with Arthur Mainwaring and after his death with General Charles Churchill. She was buried in Westminster Abbey with high honors. Her most famous rôles were: Lady Betty Modish in 'The Careless Husband'; Jane Shore; Cleopatra; Sophonisba; etc.

**Oldham**, öld'am, **John**, American colonist: b. England 1600; d. Block Island, R. I., 1636. He came to Plymouth from England in 1623, but because of designs against the Plymouth government entertained by him with John Lyford, a Church of England clergyman, he was banished from the colony. He subsequently made his peace with the colonists and was of service to them on several occasions. Removing to the Massachusetts Bay Colony he settled in Watertown, which he represented in the first General Court. His murder by Indians on Block Island in 1636 was the chief incident leading to the Pequot War.

**Oldham**, England, a town in Lancashire, 6 miles northeast of Manchester. From an insignificant village in the 18th century, Oldham during the 19th century became one of the chief seats of the cotton industry, and an important coal-mining centre. Its numerous other industries include wool-weaving, hat-making, iron-founding, and the manufacture of engines, machines, gas-meters, etc. Although irregularly built on hilly ground and of no great architectural pretensions, Oldham is distinguished for its municipal enterprise and the administrative ownership of its various public utilities as gas, water, electric lighting plant, street railroads, etc. Pop. about 140,000.

**Oldhamia**, a genus of carboniferous brachiopods, known as fossils in the rocks of India and China. The name has also been applied in Great Britain to some remains of indeterminate character, probably of sea weeds.

**Oldmixon**, öld'mik-son, **John**, English political writer: b. Axbridge, Somerset, 1673; d. 1742. In his 'Essay on Criticism in Prose' (1728), he attacked Pope, who returned the compliment by abusing Oldmixon in the 'Dunciad.' He published also: 'The British Empire in America' (1708); 'A History of England' (1730-9); 'Memoirs of the Press' (1742); etc. He was distinguished for his hatred of the Stuart family.

**Oldtown**, Maine, city in Penobscot County; on the Penobscot River, and on the Bangor & A. and the Maine C. R.R.'s; about 11 miles northeast of Bangor. It was settled in 1820, and was a part of Orono until 1840 when it was incorporated as a town, and was chartered as a city in 1891. It is in a lumber region, and the chief manufactures are wood products, machinery, and foundry products, pulp, boots and



## OLE BULL—OLENEK

shoes, woolen goods, and large quantities of lumber in different forms. Some of the prominent buildings are the Odd Fellows building, the city hall, and the high school. It has a free public library and a city hospital. The revised charter provides for a mayor and council elected annually. Pop. (1900) 5,763; (1910) 6,317. Consult Howard, 'History of Penobscot County.'

**Ole Bull.** See BULL, OLE BORNEMANN.

**Olean**, ô-lê-ăn', N. Y., city in Cattaraugus County; on the Allegheny River at the mouth of Olean Creek, and on the Pennsylvania, the Erie, the Pittsburgh, Shawmut & N. R.R.'s; about 68 miles in direct line south by east of Buffalo. It was settled in 1804 by Major Hoopo and David Heuston, was incorporated as a township in 1808, as a village in 1854, and was chartered as a city in 1893. It is in a fertile agricultural region, and near the Pennsylvania oil fields. In the vicinity is a mass of rocks of peculiar formation known as "Rock City." It is a distributing point for large quantities of petroleum which is brought by pipe lines from the oil fields south of the city, and considerable of it is sent by the same means to other cities. The lumber and leather interests are important. The chief manufacturing establishments are lumber mills, tanneries, oil-refineries, glass factories, machine shops, railroad shops, cooperages, wagon and carriage factories, brewery, brick yards, flour-mills, and furniture factories. The number of employees is about 3,000. It has a large trade in oil, lumber and lumber products, leather, and glass. It has a hospital, a State armory, a city park, and a driving park. The educational institutions are eight public schools, one parish school, a Commercial College, and the Foreman Library. There are about 20 church buildings; the Methodists and Roman Catholics have each three. The two banks have a combined capital of \$225,000, and the total assets are over \$4,000,000. The government is vested in a mayor, elected for two years, and 12 aldermen, six of whom are elected each year. Pop. (1900) 9,462; (1910) 14,743.

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**Olean'der**, a genus of shrubs (*Nerium*) of the order *Apocynaceae*. The two or three species have narrow, leathery, evergreen leaves and terminal cymes of flowers, usually pink, followed by pods containing twisted seeds. The common oleander (*N. oleander*) is a native of subtropical and tropical Asia and of the Mediterranean region, whence it has been introduced into other warm countries as an ornamental shrub and hedge plant, and into greenhouses for growing in tubs. In the Bermudas it is so abundant that the landscape is perceptibly tinted by its bloom at some seasons. Otherwise the shrub seems to have few uses though charcoal from its soft light wood is used in Algeria for making gunpowder. The plants are easily grown from cuttings placed in water or in wet sand. They thrive best in rather moist soil, but will also do well upon high land if they obtain a good root-hold. The sweet-scented oleander (*N. odorum*), a native of Japan, India and Persia, is less sturdy than the common species, and is less cultivated.

**Oleas'ter**, or **Silverberry**, a shrub (*Elæagnus angustifolia*) of the order *Elæagnaceae* (q.v.), an ornamental plant introduced from western Asia and southern Europe into temperate

climates as an ornamental plant. It grows about 20 feet tall, is often spiny, has narrow light green leaves about two inches long, small, fragrant bell-shaped flowers, followed by yellow, oval silvery-scaly fruits. It seems to prefer well drained limy soils and sunny situations. It is very popular in cold climates, especially in the Dakotas and Minnesota, where it has proved hardy.

**O'lefant Gas.** See ETHYLENE.

**Oleic Acid**,  $C_{18}H_{34}O_2$ , the most important member of the "oleic" series of acids occurs as the glyceride triolein,  $C_{57}H_{110}O_6$ , in most liquid and solid fats as olive, almond, and cod-liver oils, lard, tallow, etc., olive oil being about 72 per cent pure olein. To obtain the free acid the fat is saponified with alkali, the soap so formed dissolved in water and the fat acids liberated by the addition of dilute hydrochloric or sulphuric acids. This impure oleic acid is heated for a time with powdered lead oxide (litharge). The lead salts so obtained are extracted with ether which dissolves only the lead oleate. On acidifying the ethereal solution with dilute hydrochloric acid the lead is precipitated as lead chloride, leaving the pure oleic acid in solution from which it can be obtained by evaporation of the ether. The decomposition of triolein into oleic acid and glycerine may be accomplished by other means such as heating with superheated steam or with water and sulphuric acid. Oleic acid is a thin colorless oil at ordinary temperatures but solidifies when cooled to 4° C. (39° F.). Crystallizes from alcohol in silky needles melting at 14° C. (57° F.). Specific gravity at 19° C. (66° F.) is 0.897. It decomposes when heated to boiling at ordinary atmospheric pressure, but may be distilled unchanged under diminished pressure or with superheated steam. Insoluble in water, very soluble in alcohol, ether, and most other organic solvents. It is a monobasic acid forming many well defined salts, many of which are of use in the arts or in medicine. Sodium oleate is the chief constituent of castile soap; potassium oleate is found in soft soap; lead oleate is the "lead plaster" of the pharmacist. When well cooled oleic acid is treated with nitrogen trioxide it is changed to a solid isomeride, elaidic acid, which is used to some extent in making candles.

**Olein.** True olein is the glyceride of oleic acid. Composition,  $C_{57}H_{110}O_6$ . It occurs in most vegetable and animal fats, notably in olive oil, lard, and tallow. A colorless, odorless, nearly tasteless oil, insoluble in water, only slightly so in alcohol, soluble in ether. Alkalies saponify it to the alkali salt of oleic acid (soaps) and glycerine. Nitrogen trioxide changes it to its solid, isomeride elaidin. It is difficult to obtain it perfectly free from the glycerides of other acids occurring with it. The term "oleine" is applied to various commercial products, such as the liquid fats used by the soap-maker and the liquid fatty acids utilized by the candle manufacturer.

**Olenek**, ô-lyë-nyôk', a river of northern Siberia, which rises between Mounts Boldisno and Dsholokon, and after a tortuous northeastern course of about 1,000 miles enters the Arctic Ocean 100 miles to the west of the Lena delta. It is six miles wide and 20 feet deep at its

## OLEOMARGARINE — OLÉRON

mouth, on the left bank of which is the village of Ust Olenksœ.

**Oleomargarine**, a mixture of fats used as a substitute for butter. Oleomargarine was invented by a Frenchman, Mège-Mouries in 1870. His idea was to produce a substance very like butter in physical properties and chemical composition that would be more wholesome than and as cheap as poor butter. He used the best of beef-suet as a basis; 1,000 parts of well washed and finely chopped fat were digested at 45° C. (113° F.) with 300 parts of water, 1 part of carbonate of potash and two stomachs of sheep or pigs. After two hours the membranes had dissolved under the influence of the pepsin of the stomachs and the melted fat had risen to the surface. It was drawn off, salted and allowed to cool whereupon most of the stearin and palmitin crystallized out. This semi-solid mixture was subjected to hydraulic pressure and the fluid oleo 50-60 per cent pressed out. The oleo was churned with 10 per cent of its weight of milk together with a little butter color, and the product worked up like regular butter. Many changes have been made in the manufacture of oleomargarine since its invention by Mège-Mouries. The process given below as described by Armsby ('Science,' Vol. 7, pp. 471-472) is essentially the same as that described by Armour and Swift and is a fair representative of that followed in this country. From the beef-tallow is prepared the oleomargarine oil of Mège. The caul fat of freshly killed beeves is, after thorough washing first in tepid water and then in iced water, allowed to stand in a cold room until thoroughly cold. It is then rendered at a temperature between 130° and 175° F. The resulting oil is allowed to cool slowly until a considerable portion of the stearin and palmitin has crystallized out, and the pasty mass is then subjected to hydraulic pressure. The still fluid (about two thirds of the whole) flows out into a tank of cold water, where it solidifies into a granular mass which is known to the trade as "oleo" oil or simply "oleo." The name "oil" is somewhat misleading as the product is a granular solid of a slightly yellow color. Fresh leaf lard treated in substantially the same way as the beef tallow yields the "neutral lard" or "neutral" of the trade, also a granular solid of a white color.

The objects of this treatment are twofold, first, to produce fats as free as possible from taste or odor; second, to remove some of the difficultly fusible stearin and palmitin, in order that the finished product may melt readily in the mouth. Having thus secured the fats in the proper condition, the manufacturer proceeds to mix "oleo" and "neutral," the proportions varying according to the destination of the product; a warm climate calling for more "oleo," a cold one for more "neutral," and to flavor the mixture with butter. This flavoring is conducted in large steam-jacketed vessels provided with revolving paddles, by which their contents can be thoroughly agitated. Here the "oleo" and "neutral" are melted and thoroughly agitated with a certain proportion of milk, or sometimes of cream, and a proper amount of butter-color. Forty-eight gallons of milk to 2,000 pounds of product are stated to be a common proportion. After sufficient agitation, the melted mass is run into cold water and as it cools is broken up by paddles so as to granulate the mass. After thorough washing it

is salted and worked exactly like butter. The product is known as oleomargarine. Although it contains hardly more than a trace of butter, the latter flavors the whole mass so strongly that when well salted, as it usually is, it might readily pass with an inexpert or careless consumer for rather flavorless butter. Oleomargarine is the cheapest product made. By adding to the material in the agitator or "churn" more or less pure butter what is known as butterine is produced, two grades of which are commonly sold, namely, "creamery butterine" containing more and "dairy butterine" containing less butter. Certain other substances such as cottonseed-oil, sesame oil sugar, glycerine, and glucose are used to some extent by a few, usually unimportant makers. On the question of the wholesomeness of artificial butter there is a wide difference of opinion, but most authorities say that a butter substitute carefully made from the fresh clean fat of healthy beeves or swine is wholesome.

The physical properties of oleomargarine are so similar to those of butter that it is very difficult to distinguish between them by any superficial test. For a good test that can be applied in the household, consult 'Farmers Bulletin' (No. 131) United States Dept. of Agriculture (to be obtained for the asking from the Secretary of Agriculture). The analytical chemist is able to detect oleomargarine by making use of the fact that it contains a large percentage of fatty acids not soluble in water and a lower percentage of those volatile with water vapor than butter does. There has been both Federal and State legislation regarding this substance. The Federal law of 1886 imposed a special tax on the manufacturer (\$600 per annum), the wholesaler (\$480) and the retailer (\$48). In addition the manufacturer must sell it in stamped packages, the stamps making an extra tax of two cents a pound. The act of 1902 abolished this tax of two cents but established new rates, namely, 10 cents a pound on artificially colored oleomargarine, while oleomargarine free from any color that would cause it to look like butter was rated at one fourth of a cent a pound. The special taxes on the maker, etc., were not changed. Most States have an extra tax of their own. They vary widely and change frequently. Some merely add a few cents a pound, while others fix so high a rate or such conditions of manufacture or sale as to be practically prohibitory.

The production of oleomargarine in this country in 1888 was 34,325,527 pounds which increased to 126,316,427 pounds in 1902. Only about 3 to 4 per cent of it was exported. "Oleo oil," however, was exported in large quantity (161,651,413 pounds in 1901), more than half going to the Netherlands.

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**Oleometer**, ô-lê-ôm'ê-têr, a species of hydrometer adapted for determining the relative densities of oils.

**Oléron**, ô-lâ-rôn, France, an island in the Bay of Biscay, its nearest point two miles from the coast of the department of Charente-Inférieure, opposite Rochefort. It is 19 miles long by about five broad, and is very fertile. On it are the port of Le Château and the small towns of Saint Pierre d'Oléron and St. Georges d'Oléron. In history, the island is noted for the *Jugements ou Rôles d'Oléron*—Judgments or

**Laws of Oléron**, a code of maritime law compiled by command of Eleanor of Guienne before she married Henry II. of England, and modeled on the 'Book of the Consulate of the Sea' (a maritime code regulating commerce in the Levant). It was drawn up from the decisions of the maritime court of Oléron, in the duchy of Guienne, and was intended for the use of mariners in the Atlantic waters, was introduced into England in the end of the 12th century and into Flanders in the 13th. The usages and decisions upon which it was based were those observed in the wine and oil trade between Guienne and the ports of England, Normandy, and Flanders. The code formed the basis of modern maritime law. It was published for the first time in the 'Collections des Lois Maritimes' of M. Pardessus. An English translation was published as 'Rutter of the Sea.' See **COMMERCIAL LAW**.

**Olevianus**, ō-lē-vī-ā'nūs (Ger. ō-lā-vē-ā'-noos), **Kasper**, German religious reformer: b. Treves 10 Aug. 1536; d. there 15 March 1587. He studied law in Paris, Orleans, and Bourges, where he became acquainted with the teachings of Calvin. Further theological learning was acquired by him in Geneva and he began to teach the Reformation doctrine in Treves in 1559, and to promote the spread of the new movement under the inspiration of Calvin. This roused the hostility of the archbishop, and the reformer was compelled to retire to Heidelberg, where he was appointed member of the church consistory, and court preacher. He now in collaboration with Ursinus produced the Heidelberg Catechism. His Lutheran sympathies led Louis VI. to depose him from his ecclesiastical preferments in 1576; and he went to Berleburg and thence in 1584 to Herborn, where he advocated the doctrines of the Reformation in the territories of Count von Wittgenstein and Nassau. His special contribution to the progress of the Reformation was of a practical and administrative character, and from him the Reformed churches received that Presbyterian type of organization and policy which has become permanent in Europe and America, where his method of government by synods has become universal. Consult: Harbaugh, 'Fathers of the German Reformed Church'; Hagenbach, 'Väter und Begründer der Reformierten Kirche' (1857).

**Olfactory Nerve**. See **NOSE AND THROAT**.

**Ol'ga, Saint**, a peasant girl taken to wife by the Grand-duke Igor of Kiev, who met her by chance when on a hunting party in Pskoff. She possessed remarkable talents and an exalted character. After her husband had lost his life in battle (945), she managed the government for his son, a minor. Then going to Constantinople, she was baptized by the Patriarch Theophilactes and took the name of Helena. After her death in 969 she was canonized by the Greek Church under her original name and her festival is kept on the 11th day of July (O. S.).

**Ol'iban** (more fully **OLIBANUM**), a gum-resin which flows from incisions in certain species of *Boswellia*, a genus of trees of the family *Burseraceae*, noted for the production of aromatic gums, growing on bare rocks in the mountains of southern Asia and northeastern Africa. Olibanum is the *lebanah* of the Hebrews, *libanos* or *libanotos* of the Greeks, thus of the Romans, of all which terms the ordinary English translation is "frankincense" (q.v.). It

is produced mainly or altogether by *B. serrata*, a large tree growing on dry and rocky ridges from Abyssinia and southern Arabia to northern India; but oliban comes principally from Somaliland (the best) and from Arabia. Aden is the chief point of collection, exporting from 1,500,000 to 2,000,000 pounds annually, much of which goes to India and China. The gum occurs in commerce in semi-transparent yellowish tears and masses; has a bitter nauseous taste; is hard, brittle, and capable of being pulverized; and diffuses a strong aromatic odor when burned. It was formerly used in medicine, but now is chiefly employed as incense in Roman Catholic churches and Indian temples. It contains 56 per cent of resin soluble in alcohol, 30 per cent of gum soluble in water, and from 4 to 8 per cent of an aromatic oil. Another species of *Boswellia* supplies in India an inferior gum of similar properties, used both as incense and as a substitute for pitch.

**Olid, Cristóbal de**, krēs-tō'bāl dā ō-lēd', Spanish soldier: b. about 1490; d. Naco, Honduras, 1524. He was brought up in the retinue of Diego Velazquez, governor of Cuba, who in 1518 sent him with a small force to find Grijalba, of whom nothing had been heard since his setting out for Yucatan. In Yucatan he met Cortez and was induced by him to desert Velazquez and join the other in his adventurous schemes, but in 1524 was captured and beheaded by one of Velazquez's kinsmen.

**Oligar'chy**. See **GOVERNMENT**.

**Oligocene System**, in geology, a name introduced by Beyrich (1855) for beds in North Germany, especially at Mainz, including portions of formations of the upper Eocene and the lower Miocene, and so forming a fourth subdivision of the Tertiary (q.v.), namely into Eocene, Miocene, Oligocene, and Pliocene. The rocks of the Oligocene are freshwater, brackish, or marine in origin and display a quasi-tropical flora; they occur in the Paris Basin, in Switzerland, where they are called Molasse, and rather rarely in North America, where the more important beds identified with the Oligocene occur in the Northwest Territory, North Dakota, along the White River, and from Florida to Texas, the last being styled the Vicksburg beds by Conrad and the Orbitoidic beds by Heilprin, who first called attention to the frequent occurrence in it of a fossil foraminifer, *Orbitoides mantelli*.

**Ol'igochæ'ta**, an order of chaetopod annelids (see **CHÆTOPODA**) of which the earthworm (q.v.) is the most familiar example. The species are almost solely inhabitants of the earth or of fresh water, have the segments of the body similar, and differ from the marine chaetopods (*Polychæta*, q.v.) in their greater simplicity of structure, doubtless the result of degeneration. Thus they lack all appendages—cirri, palpi, tentacles, etc.—as well as parapodia, the bristles arising directly from the body-wall, either distributed regularly or arranged in four bunches on each segment. Usually eyes are lacking and there is no metamorphosis in development. These animals are hermaphroditic, and usually some of the segments are markedly glandular, forming a girdle (clitellum) which secretes the cocoon in which the eggs are laid. The group is divided into the aquatic or parasitic species (*Limicola* or *Microdrile*) and the terrestrial

## OLIGOCLASE—OLIPHANT

forms (*Terricola* or *Macrodrile*). The aquatic species are mostly minute.

**Oligoclase** (Greek, "slight fracture"), one of the feldspar unisilicates, with the possible formula  $(\text{CaNa})_2\text{Al}_2\text{Si}_4\text{O}_{12}$ . It crystallizes in the triclinic form; has a single clean fracture; is not affected by acids; varies in color from white to greenish; has a specific weight of 2.62–2.65 and a hardness of 6; occurs in granite and other early rocks in Switzerland, Germany, Sweden, and in the United States in New Hampshire, Connecticut, North Carolina, and elsewhere. A reddish variety with fine iron oxide crystals is used as a gem and is called sun stone.

**Olin, Stephen**, American Methodist clergyman: b. Addison County, Vt., 7 March 1797; d. Middletown, Conn., 16 Aug. 1851. He was graduated at Middlebury College, Vt.; was appointed president of the Abbeville Seminary, S. C., and subsequently entered the ministry of the Methodist Episcopal Church. In 1828 he was appointed professor in Franklin College. In 1833 he was transferred to the Virginia conference, and elected president of Randolph Macon College. Later he spent some time in foreign travel, and in 1842 became president of Wesleyan University, Middletown, Conn. He was an impressive preacher, and a prominent advocate of the evangelical alliance. He wrote 'Travels in Egypt, Arabia Petrea, and the Holy Land' (1843), and 'Greece and the Golden Horn' (1854). Consult his 'Life and Letters' (1853).

**Olinda**, ô-lên-dâ, Brazil, a seaport town of Pernambuco, five miles north of the city of Pernambuco, which replaced it as the capital and commercial centre of the state, after the Dutch burned Olinda in the 17th century. Olinda was founded in 1535. Pop. 8,000.

**Oliphant, ôl'f-fant, Laurence**, English traveler and author: b. Cape Town, South Africa, 1829; d. Twickenham, near London, 23 Dec. 1888. He was the son of a chief justice of Ceylon, and after a boyhood spent in England went to Ceylon in 1841 and was subsequently private secretary to his father. Although later called to the bar he spent much of his time in travel, visiting the Crimea in 1852, and Canada and the United States (1853–4) as private secretary to Lord Elgin, and in 1855 he served under Omar Pasha in the Crimean war. The next year he joined Walker, the filibuster, at New Orleans, and was attached to Lord Elgin's China mission 1857–9. The year 1860 saw him with Garibaldi in Italy and the year after he was first secretary of legation at Yeddo, Japan, where he was wounded by assassins. He sat in Parliament for the Stirling Burghs 1865–7, but having by this time come under the influence of the mystic, Thomas Lake Harris (q.v.), he resigned his seat and entered the brotherhood which Harris had founded at Brocton, Chautauqua County, N. Y. At Brocton, under the orders of Harris, he was forced to do the hardest kind of farm labor, and there his mother joined him, but was not permitted to hold any confidential intercourse with him. Both mother and son gave up their private means to the community. In 1870 Oliphant returned to Europe and was *Times* correspondent during the Franco-Prussian war. In 1872 he

married and the next year, with his wife and mother returned to Brocton. All three of the Oliphants were now the obedient slaves of Harris, and while his wife and mother were employed in menial duties Oliphant was called upon to engage in commercial enterprises for the good of the community. Husband and wife were presently separated by the command of the inexorable Harris, the wife being removed to a branch of the community in California. At last, in 1882, they emancipated themselves from the Harris influence, and after more wandering Oliphant finally settled at Haifa, in the Bay of Acre, and busied himself with schemes for assisting the Jews to return to Palestine. Although he had broken with Harris he still retained visionary beliefs not easy to define. In spite of his singular mysticism he was a shrewd man of business, a polished man of the world, and a writer of rare talents. That he was insane is hardly credible, though this is sometimes urged, but that he was more or less unbalanced is evident. Among his many books are: 'The Russian Shores of the Black Sea' (1853); 'The Tender Recollections of Irene McGillicuddy' (1878); 'Piccadilly,' a novel (1865); 'Altiora Peto' (1883); 'Episodes in a Life of Adventure' (1887); 'Haifa, or Life in Modern Palestine' (1887); 'Masollam' (1886). Consult 'Memoir of Laurence Oliphant and Alice, his Wife,' by Mrs. Margaret Oliphant (1891).

**Oliphant, Margaret Oliphant Wilson**, English novelist: b. Wallyford, near Musselburgh, Scotland, 4 April 1828; d. Wimbledon, Surrey, England, 25 June 1897. She removed with her parents to Liverpool in childhood and in 1852 was married to her cousin, Francis Wilson Oliphant, an artist in stained glass, who died in 1859. She began literary work early, publishing 'Passages in the Life of Mrs. Margaret Maitland' in 1849, and this was quickly followed by several other tales of Scottish life. After the death of her husband her family was supported entirely from the earnings of her pen, and during her long literary career she published 120 books and quite as many contributions to 'Blackwood's Magazine' in the shape of reviews, etc. Few women of her time have surpassed her in the amount of work accomplished and the even excellence of what she wrote. Of her many novels among the best are the five comprising 'The Chronicles of Carlingford' (1863–76)—of which 'Salem Chapel' (1863) and 'Miss Marjoribanks' (1866) are the most important.—'Within the Precincts' (1879); 'Harry Joscelyn' (1881); 'The Ladies Lindores' (1883); 'The Sorceress'; and 'The Cuckoo in the Nest' (1892). She was not a great novelist, for she lacked constructive power, and her plots are not always effective; but her careful and sympathetic analysis of character, her humor, pathos, invention, and naturalness entitle her to a high place among novelists of the second rank. Of several tales of the supernatural by her 'A Little Pilgrim in the Unseen' (1882), is the best known, but is surpassed in power by 'A Beleaguered City' (1880); and 'Old Lady Mary' (1884). In addition to her work in fiction she produced a large number of biographies and works of literary history, such as the 'Life of Edward Irving' (1862), a remarkable piece of sympathetic biography;

## OLIVAREZ — OLIVE

'The Makers of Florence' (1874); 'The Literary History of England 1790-1825' (1882). 'The Victorian Age of English Literature,' with her son F. R. Oliphant (1892); 'Historical Characters of the Reign of Queen Anne' (1894); 'Annals of a Publishing House' (1897); etc. In spite of much sorrow in her life her outlook upon existence was cheerful and tolerant, and her influence upon English fiction was wholesome in every respect. For a half century her admirable fictions were the delight of a wide circle of cultivated readers in this country and her own, and her 'Chronicles of Carlingford,' at least, have in them something of the same quality which renders Trollope's Dorsetshire tales so enduring. Consult 'Autobiography and Letters of Mrs. Oliphant' edited by H. Coghill (1899).

**Olivarez, Gaspar de Guzman,** gäs'pär dā gooth-mān ô-lē-vā'rēth, Spanish prime minister: b. Rome 6 Jan. 1587; d. Toro, Spain, 22 July 1645. He was educated at the University of Salamanca, was a gentleman of the bed-chamber to the Prince of Asturias, and gained the favor of his royal master to such an extent that soon after the latter succeeded to the throne as Philip IV. Olivarez was appointed prime minister. For 22 years (1621-43) his power was almost unlimited. His sole object soon became the extortion of money from the people to supply the expenses of the war with Holland, France, and other powers. His severity occasioned revolts in Catalonia and Andalusia, and the Portuguese threw off the Spanish yoke, and acknowledged the Duke of Braganza king in 1640. The foreign wars were so fatal to Spain, whose armies were defeated by the French, and whose fleets were destroyed by the Dutch, that the king was compelled by universal public discontent to dismiss his minister.

**Ol'ive, PRINCESS OF CUMBERLAND,** title assumed in 1821 by Mrs. Olivia Serres: b. Warwick 3 April 1772; d. 21 Nov. 1834. Her maiden name was Wilmot; she married John Thomas Serres in 1791 and was separated from him in 1803. She wrote poetry and fiction and several pamphlets (1813-17) urging the claim of her uncle, James Wilmot, to be the author of 'Junius Letters.' In 1821 she was arrested for debt, and moved a stay as being daughter of the Duke of Cumberland. She asserted that £15,000 had been left her by George III., who recognized her as Cumberland's daughter, but she died without being able to see the King's will. Her claims were continued by her daughter Lavinia (1797-1871), who married Thomas Ryves, a portrait painter, was divorced from him in 1841, and in 1866 procured a verdict that her mother was not the daughter of the Duke of Cumberland. This *cause célèbre* was built upon most outrageous forgeries, but both Mrs. Serres and Mrs. Ryves succeeded in interesting Sir Gerald Noel and others in their pretensions.

**Olive Thorne.** See MILLER, HARRIET MANN.

**Olive,** one of the leading fruits of the world. It is borne by a small tree (*Olea europæa*) of the order *Oleaceæ*, and is the most important member of its genus, which includes between 30 and 40 species. This tree is a native of western Asia and probably of the Mediterranean region, and attains a height of about 25 feet, bears small lanceolate leaves and axillary

racemes of fragrant yellowish-white flowers followed by oblong or ovoid fruits (drupes). From remote antiquity it has been cultivated as a food-plant, especially for the oil pressed from its fruits. Throughout the sub-tropical parts of the Old World the olive has been grown upon a commercial basis for many centuries, individual trees being known to be more than 1,000 years old. It was introduced during the 18th century into California, which is now the leading olive-producing district of the United States, but part of Arizona and New Mexico are adapted to olives and are gradually coming into notice. The assumption is made that seed was introduced in 1769 from Mexico and planted at the San Diego Mission, whence cuttings were taken to other missions throughout California; and this olive, the only one known in the State until about 1880, was called the "Mission" variety. Since 1880 numerous varieties have been introduced from olive-growing countries of Europe.

The olive succeeds best in warm dry climates. It will withstand some frost, but at blossoming time this is believed to impair if not to destroy the crop; and the same result is often attributed to high wind and very dry air at that time. A rich, well-drained soil is preferred, but the tree will succeed and produce excellent crops upon a very great variety of soils; it is usually a mistake, however, to plant it upon rocky hillsides, as too numerous failures in California prove. While not exacting as to food, the trees must have an adequate fertilizer. The return to the soil of the pomace after the oil has been expressed, together with slight dressings of commercial fertilizers and judicious cultivation, will keep the trees in lusty bearing condition. The trees are usually set about 30 feet apart either in hexagons or in squares, the former plan being preferred in California because it is more economical of land, and permits of plowing in three directions instead of only two. The land is kept cleanly cultivated throughout the season.

The olive is propagated by layers, suckers, sprouts, cuttings, tips of twigs, grafts, buds, and seeds. The last three, being tedious and slow, are rarely employed. The favorite method is by means of tips. These are obtained from small dormant branches, partly defoliated, rooted in moist sand and then transplanted in nursery rows. The trees should begin to bear when about eight years old and reach full productivity when about 30.

**Olive Oil.**—The principal uses of the olive are for oil production, for pickling, either green or ripe, and for drying. For the production of oil, the ripe fruits are carefully gathered by hand, bruised as little as possible and preferably crushed at once, otherwise they are partially dried in very thin layers through which air must circulate freely to avoid molding and fermenting, unsound fruit being prone to decay and impair the flavor and odor of the oil. An old practise was to crush the fruit by means of heavy mill-stones in pits, but the oil thus extracted from the kernels has been found to injure both the flavor and the keeping quality of the oil obtained from the pulp. Modern crushers, therefore, do not break the stones. The crushed pulp is then pressed in linen sheets, the pressure being applied very gradually. A

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second pressing is made after the pulp has been mixed with cold water. Other pressings are sometimes given, each one resulting in a grade of oil inferior to the preceding. The two first grades are sometimes mixed. Since the separation of the oil from the juice by gravity is hazardous on account of liability to ferment, the impurities are washed out quickly by special apparatus in which a current of cool water comes in contact with a small quantity of the juice, mixes with it, separates the larger particles of pulp and allows the oil to rise through a tall column of water which further washes the oil-globules as they rise. After being allowed to stand for a time in a cool room this oil is raked off and sold as "new oil," or may be again allowed to stand for further clarification. Since the American market demands a clear oil, however, much of the domestic oil is filtered, a process which, especially if often repeated, impairs the flavor and makes the oil seem greasy. Throughout the process, scrupulous cleanliness is essential, because olive oil is prone to absorb any taint either in the utensils or in the air. The oil is pale yellow, inodorous, and has a specific gravity of .918 at a temperature of 15° C. It is largely used in cookery and pharmacy, for lubricating and illuminating purposes, and for making Castile and other kinds of soap, for which purpose the lower grades are most employed. In the United States it is often adulterated with cottonseed-oil. Gallipoli oil, which is used in dyeing, is made from the fermented fruit.

Olive oil also has important medical uses. In doses of from one to two ounces for adults, and one teaspoonful for infants, it acts as a laxative. It is also used in intussusception of the bowels; as an antidote in cases of acrid poisoning; as a local neutral protective from the atmosphere; in place of suet, lard, etc., as anunction to increase the fat of the body, or to reduce the heat of the skin, and by workmen in lead factories as a laxative, and to prevent the absorption of lead. Combined with camphor, morphine, etc., it is applied to wounds, burns, and bruises, and forms the basis of many liniments. It is used to allay the pain of insect bites, and (warmed) in the ear, to destroy insects. It is also employed as an application to swollen breasts, as a lubricant of surgical instruments, sounds, pessaries, etc., and as an injection in cases of constipation; but for this last purpose it is inferior to castor oil. In large doses, it is believed by some physicians to hasten the discharge of gall-stones, sometimes apparently softening them.

**Pickled Olives.**—For pickling the fruits are gathered by hand before they are likely to become soft during the process, a degree of maturity not readily described except by saying that the time is just before the fruits would change from green to the mature fruit tint, which varies with the variety from yellow to almost black. They are first placed either in pure water, which must be changed each day, or in a weak solution of lye. This is to remove the bitterness and acidity and to soften the skin. After the latter process, which may occupy from one to three months, the lye is removed by soaking in pure water. Then the olives are subjected to a series of immersions in salt solutions

of gradually increasing strength, the maximum being dense enough to float an egg. They will now keep for years if properly stored. Pickled green olives are much less a food than a table delicacy or relish; but pickled ripe olives, which are prepared by much the same process and are gaining in favor, are considered primarily as a food. Dried olives are popular in some Mediterranean countries, but are little known in the American market.

The average composition of pickled green olives is: water, 78.4; fat, 12.9; carbohydrates, 1.8; protein, ash, etc., 6.9; that of pickled ripe olives: water, 65.1; fat, 25.5; carbohydrates, 3.8; protein, ash, etc., 5.6.

Besides the species mentioned above, several other related species are valued more or less. *Olea chrysophylla*, a tropical African species, has been introduced into southern California, where it is planted for ornament, the under surfaces of the leaves being bright golden yellow. *Olea*, or *Osmanthus, fragrans*, is the fragrant olive of China and Japan, where its flowers are used for perfuming tea. It is also cultivated in greenhouses for its inconspicuous but exceedingly fragrant flowers.

In ancient Greece the olive was sacred to Pallas Athene and was a symbol of chastity and peace. Like the laurel it was used for making wreaths for crowning the victors in athletic sports.

Consult: Bailey, 'Cyclopedia of American Horticulture' (1900-2); Hayne, 'California Experiment Station Bulletin No. 129' (1900).

**Olive-back**, an American thrush (q.v.).

**Olive-shell**, the polished and often beautifully colored shell, of nearly the size and shape of an olive, of a marine gastropod mollusk (family *Olividae*), allied to the volutes and cones, many species of which inhabit the warm seas, creeping about the bottom in search of animal food at considerable depths. The front of the foot is developed into a strong sort of fender, and fleshy flaps (mesopodium) are reflected laterally over the shell. An allied genus of smaller size is *Olivella*, one species of which has been used in the South Pacific islands as a kind of shell-money. Consult Cooke, 'Mollusca' (1895).

**Ol'ivenite**, natural hydrated arseniate of copper, occurring in most copper ores. It varies in color from brown to green; and in form from crystal, usually oblique tetrahedral prisms, the common form in the English copper mines, to amorphous, being then styled "wood copper" or "wood arseniate" because of its fibrous nature. Both forms occur in the Utah copper mines.

**Ol'iver, Andrew**, American colonial official: b. Boston 28 March 1706; d. there 3 March 1774. He was graduated at Harvard College in 1724, was elected to the general court, and became secretary of the province. When the Stamp Act was passed by the English Parliament, he made himself obnoxious by accepting the office of distributor of stamps, and on 14 Aug. 1765 was hanged in effigy from the "liberty tree." In the evening of the same day, the mob cut down the effigy and burned it in front of Oliver's house. Oliver was so much alarmed that the next day he publicly resigned his office. In 1771 he was appointed lieutenant-governor. He was a brother-in-law of Governor Hutchin-



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son, and pursued the same public course, promoting, as far as possible, the designs of the British ministry. This was proved by his letters obtained by Franklin in England, and sent back to America in 1772. When, therefore, the general court petitioned the king for the removal of Hutchinson, Oliver's name was also included.

**Oliver, James**, plow manufacturer and inventor of the chilled plow: b. Scotland 28 Aug. 1823; d. South Bend, Ind., 2 March 1908. He came to America in 1835 with his parents, who, after residing for a year in Seneca County, N. Y., settled in Mishawaka, Ind., in 1836. He learned the trade of a molder, and in 1855 began the manufacture of plows at South Bend, Ind., founding the establishment of which he became president. After years of exhaustive study and expensive experiments he invented the first successful chilled plow, which made his name famous throughout the world. See *Plow*.

**Oliver, Peter**, American jurist: b. Boston 26 March 1713; d. Birmingham, England, 13 Oct. 1791. He was a brother of Andrew Oliver (q.v.), and was graduated at Harvard College in 1730; held several offices in Plymouth County, Mass.; and in 1756 was appointed a justice of the superior court, although he had never become a lawyer. In 1771 he was made chief justice. Oliver was a Loyalist, and when, in 1774, the legislature ordered the judges to refuse a fixed salary from the king, he alone declined to comply, and was impeached in consequence. He wrote in favor of the British rule in a Loyalist publication called the 'Censor,' and went to England in 1776, when the British troops evacuated Boston. There he passed the remainder of his life. He possessed considerable literary skill, and was a collector of antiquarian materials.

**Oliver Twist**, a novel by Charles Dickens, published in 1838, the name of its principal character, a workhouse orphan, being the same as the title. There are nearly 20 other characters of typical significance. The abuses of the workhouse in which Oliver was born and where he passed his childhood, and the life of crime into which he was forced by the Artful Dodger and by Fagin in his training-school for thieves are described with the painful vividness of tragedy. But the characteristic humor of Dickens is present to relieve the diabolical villainy of Fagin, the brute ruffianism of Bill Sykes, and the degradation and wretchedness of the whole environment. Bumble, the self-important parish beadle, contributing freely to this mitigating element; while through Nancy, bound as she was in the same bundle of misery, the soul of good in things evil shines out to light the way to Oliver's deliverance.

**Olives, Mount of, or Mount Ol'ivet**, the historic hill on the east side of Jerusalem, separated from the city by the valley of Jehoshaphat and the brook Kedron, and rising to a height of over 2,700 feet. It is celebrated as the scene of many biblical incidents especially in the ministry of Jesus Christ. It has four eminences extending from north to south, known respectively as Galilee or Viri Galilæi, Mount of Ascension, Prophets, and Mount of Offense. The northernmost of these derives the name

by which it is known among Christians from the fact that it is supposed to be the hill on which two angels addressed the apostles after the Ascension, as "Ye men of Galilee." The next in order, proceeding southward, gets its name of Mount of Ascension from the supposition, originated by the Empress Helena, that this was the scene of our Lord's ascension, a supposition at variance with the narrative of Luke (xxiv. 50, 51), where it is said that Christ "led them out as far as to Bethany." This was the most important of all the eminences. At its foot lay the garden of Gethsemane. The next eminence southward is rather a portion of the previous one than a separate height, and is remarkable for containing a celebrated catacomb, known as the "Tombs of the Prophets" (perhaps in allusion to the words of Christ in Matt. xxiii. 29). The southernmost eminence is called the Mount of Offense, because it is supposed to be the "Mount of Corruption" on which Solomon erected the high places for strange gods (1 Kings xi. 7; 2 Kings xxiii. 13). On the hill is the small village of El Tour on the north of which is the Chapel of the Ascension belonging to the Mohammedans but used on festival occasions by Christians. On the east are several Russian buildings, including a handsome church, a hospice for pilgrims, and a tower from which a magnificent view is obtained, especially of the Dead Sea, Jordan Valley, etc. South of the village are the Paternoster Church, or Church of the Lord's Prayer, belonging to the Roman Catholics, and also a Carmelite convent. Modern olive trees represent the historical trees from which the mount derived its name, and which were cut down during the siege of Jerusalem 70 A.D. From the village of El Tour a road to the southeast leads to Bethany, passing Bethphage. Consult Rothier, 'Ancient and Modern Palestine' (1898).

**Olivet, Mich.**, village in Walton township, Eaton County, on the Grand Trunk Railway. It was founded in 1844 and incorporated in 1866. There is a private bank and the post-office is the starting point for three rural free delivery routes. Pop. (1910) 800. The village is mainly important as the seat of Olivet College, a coeducational and non-sectarian institution, founded in 1844 by John J. Shipherd, as Olivet Institute, and chartered as a college in 1859. It is, however, closely allied with and under the management of the Congregationalists. Beside the regular preparatory and collegiate courses, the curriculum offers courses in pedagogy, the sciences, biology, and music. The college confers the degree of A.B. The main buildings are Parsons Hall, Shipherd Hall, Mather Hall, a building for the laboratories and the biological museum, and Burrage Hall, the home of the library, which in 1905 contained 30,000 volumes. There is also a small gymnasium and the campus contains 15 acres. The Olivet Congregational church is the church chapel and is the joint property of the college and church. The property of the college in buildings and endowments was valued in 1910 at \$350,000; the faculty numbered 26, students 260, and graduates 732.

FRANK HUGH FOSTER.  
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## OLIVETANS—OLMSTED

**Olivetans.** SEE ORDERS, RELIGIOUS, OF THE WORLD.

**Olivine**, natural silicate of iron and magnesium ( $Mg_2Fe_2SiO_4$ ), also called chrysolite, occurring in lava and as a principal constituent of basaltic rocks. It is possibly an original magnesian component of rocks now altered to serpentine. Olivine is transparent, olive green or brown, with a colorless streak and conchoidal fracture.

**Ollendorf's System**, an educational term applied to a 19th century method of learning languages, invented by H. G. Ollendorf (1803-65), and designed for those who teach themselves. The grammars are intended to give the students a mastery of the conversational forms of language, grammatical rules being few.

**Ollivier**, ô-lê-vê-â, **Olivier Emile**, French statesman: b. Marseilles 3 July 1825. He studied law and began the practice of his profession at Paris in 1848. Having taken part in the revolution of 1848, he was appointed commissary-general at Marseilles under the republic, afterward becoming prefect at Bouches-du-Rhône and then of Haute-Marne. In 1857 he entered the legislative assembly, where he became one of the leaders of the Liberal opposition and was one of "The Five" who were distinguished for eloquent and often successful opposition to the policy of Napoleon III. Gradually, however, he severed himself from his former political associates, and the severance was final when in January 1870, he accepted Napoleon's invitation to form a ministry. It was this ministry which declared war with Germany in July 1870, and was overthrown with disgrace in August 1870. Since then M. Ollivier has several times been a candidate for election to the Chamber of Deputies but without success. Beyond that he has taken no part in politics, but has devoted himself to writing works on legal and other subjects. These include 'Lamartine' (1874); 'Principes et Conduite' (1875); 'L'Eglise et l'Etat au Concile du Vatican' (1879); 'Thiers à l'Académie et dans l'Histoire' (1879); 'Le Concordat, est-il respecté' (1883); 'Nouveau Manuel de Droit Ecclésiastique Français' (1885); 'Michel-Ange' (1892); 'L'Empire Liberal' (6 vols., 1894-1908), a defense of his career; 'Solutions Politiques et Sociales' (1894); and 'Marie-Madeleine, Récits de Jeunesse' (1896). In 1870 he was elected a member of the French Academy.

**Olmedo**, José Joaquín, hō-sā' hō-ā-kên ôl-mā'fhō, Ecuadorian poet: b. Guayaquil, Ecuador, 20 May 1781; d. there 19 Feb. 1847. He was educated in Quito and Lima, taught law for a time in the University of Lima and then practised in his native city. He engaged actively in public affairs, was vice-president of Ecuador and governor of the department of Guayas, and in 1845 led a successful revolution against General Flores, but though he directed the provisional government he was defeated for the presidency. But his fame as a poet will outlast his political record, and few poets have been more widely read in South America than he. One of his best poems is a 'Song to Bolivar' (1826). His 'Collected Works' (Valparaiso, 1848; Paris, 1853; and Mexico, 1862) have been widely circulated. Consult: Herrera, 'Apuntes biograficos de D. J. J. Olmedo' (1887).

**Olmstead** (ôm'stêd or ùm'stêd) **Claim, The**, in American history, a celebrated case in admiralty law. Originally it was a case of capture on the high seas, and involved questions of prerogative regarding which the decisions of the Federal commissioners were set at naught by a State Court of Admiralty. One Olmstead and others, of Connecticut, being pressed into British service aboard the sloop Active in 1777, took possession of the sloop, and were in turn captured by Houston, commanding the Pennsylvania armed brig Convention. The Pennsylvania State Court of Admiralty awarded a large share of prize money to the State, and to the officers and crew of the Convention, and the owners, officers and crew of a privateer which assisted in the capture. Olmstead and others appealed to the Federal commissioners of appeals and received a favorable verdict. This the Pennsylvania State court set aside and deposited the moneys with David Rittenhouse, state treasurer. His executrixes were sued in 1802 before the newly organized United States Supreme Court, and judgment was executed in favor of Olmstead and others, in 1809, against violent opposition from Pennsylvania.

**Olmsted**, òm'stêd or ùm'stêd, **Charles Sanford**, American Protestant Episcopal bishop: b. Olmstedville, N. Y., 8 Feb. 1853. He was educated at St. Stephen's College, Annandale, N. Y. and the General Theological Seminary, New York, and was ordained priest in 1877. He was subsequently rector of St. Asaph's Church, Bala, Pa., and in May 1902 was consecrated bishop of Colorado. He has published 'December Musings,' verse (1898); 'The Discipline of Perfection' (1902).

**Olmsted**, **Charles Tyler**, American Protestant Episcopal bishop: b. Cohoes, N. Y., 28 April 1842. He was graduated from Trinity College, Hartford, Conn., in 1865, and after studying for the ministry at St. Stephen's College, Annandale, N. Y., took orders, was assistant in Trinity parish, New York 1868-84; rector of Grace Church, Utica, N. Y., 1884-99; and vicar of St. Agnes Chapel, New York, 1899-1902. In October of the year last named he was consecrated bishop-coadjutor of the diocese of central New York and in 1904 became bishop.

**Olmsted**, **Frederick Law**, American landscape architect: b. Hartford, Conn., 26 April 1822; d. Waverly, Mass., 28 Aug. 1903. He had some early instruction (1837-40) in civil engineering, went to sea, after a year before the mast studied agricultural science and engineering at Yale, and later was for seven years a farmer and horticulturist upon his own land. In 1850 he made a tour, largely on foot, of Great Britain and parts of the Continent, for the study of methods of agriculture and landscape gardening. In 1852-3, 1853-4, and 1856 he traveled in the South and Southwest, investigating the effects of slavery upon the economic and social condition of slave States. The results of his observations appeared in three successive volumes, 'A Journey in the Seaboard Slave States' (1856); 'A Journey in Texas' (1857); and 'A Journey in the Back Country' (1861). In 1861 a compiled work, based upon the three preceding, appeared in London as 'The Cotton Kingdom,' an account, says H. T. Tuckerman, "copious, specific, and authentic," which,

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it is stated, was frequently quoted by such leaders of English opinion as favored the Northern viewpoint in the Civil War. In 1856 he again visited Europe, giving particular attention to parks; and three other trips were subsequently made. In 1855 the State legislature of New York passed an act for the construction of a large central park in New York city, and in 1857 Olmsted was made superintendent of the preparatory work. With Calvert Vaux (q.v.) he presented a plan for the park which was selected for the prize from 33 plans submitted in competition. Olmsted then became architect-in-chief, with Vaux as assistant, and despite political difficulties in four years practically completed the task. He employed at one time a working force of nearly 4,000 with a high degree of efficiency. In 1861 he was appointed by Lincoln to the United States Sanitary Commission, of which he became secretary and general manager. He displayed in this post great administrative ability. Besides conducting a necessarily large correspondence, he obtained legislation, visited the field, and prepared reports. He aided in the formation of the Union League Club, and was prominent in the organization of the Southern Famine Relief Association. In 1863 he resigned from the Commission and became first commissioner of the Yosemite National Park and the Mariposa Grove. He was in partnership with Vaux and Withers at New York in the practice of landscape architecture in 1865-72, was for a time president and treasurer of the New York park commission, and later for about six years was landscape architect to the commission. In 1878 he removed to Boston and there continued his professional practice. This was very large, and in the pursuit of it he visited every State in the Union, and eight times crossed the Continent. In 1895 he retired. A list of the public and semi-public grounds formed wholly or largely after his plans would be very extensive. It has been estimated that among the expressions of his art are more than 80 public parks, including prominently, besides Central Park, the Mount Morris, Riverside, and Morningside parks of New York; the Prospect and Washington parks of Brooklyn; the Washington and Jackson parks of Chicago; the Back Bay Fens of Boston, one of the most interesting domains of the kind in America; also in Boston, Leverett, Jamaica, Franklin, and Marine parks; Belle Isle Park of Detroit; the Cherokee, Shawnee, and Iroquois parks of Louisville; Delaware, South, and Cazenovia parks of Buffalo; Lake, West Side, and River parks of Milwaukee; and Washington Square in Baltimore. He laid out the grounds for the World's Columbian Exposition at Chicago in 1893, whose landscape features were so remarkable a success. He designed the general scheme for the preservation of the natural scenery at Niagara Falls. He planned the grounds of the Capitol at Washington, besides the marble terrace, and the grand staircase and other structures exterior to the building. Among his further works are designs for the grounds of numerous suburban land divisions, railway stations, schools, colleges, and private estates. It is somewhat difficult to express in concise form Olmsted's distinctive service to the landscape gardening of America. But it may perhaps be defined as having been the originating of the use of natural landscape resources, existing

under urban or partially urban conditions toward the making of pleasure-grounds. He studied the genius of American scenery, and in the adaptation of his methods thereto made a real if unobtrusive contribution to the art of the United States. In his public parks he avoided the formal and the monumental as he had seen it in Italy and France, and combined system with wild nature in an unconventional result which is distinctive. It has been said that one of the secrets of his success was that he never endeavored to make unsuitable conditions conform to preconceived ideas, but made logical use of such conditions as they were. At the time of his death it was asserted with pardonable exaggeration, if exaggeration it were, that he had done more than any other of his generation to develop the æsthetic possibilities of the country. He was a founder of the Metropolitan Museum of Art, of the American Museum of Natural History, and of the New York State Charities Aid Association, of which for many years he was vice-president. In addition to the books above cited he wrote 'Walks and Talks of an American Farmer in England' (1852), frequently reprinted, and papers and reports on special problems of his profession. For an account of Olmsted's work on the Sanitary Commission, consult Stillé's history (1866). Consult: Century Magazine, October 1893.

**Olmsted, Frederic Law**, American landscape architect, son of the preceding: b. Staten Island 24 July 1870. He was graduated from Harvard in 1894 and studied landscape architecture under his father. Since 1898 he has been the landscape architect of the Metropolitan Park system of Boston, and of the Biltmore estate of G. W. Vanderbilt near Asheville, N. C., from 1896. He was an instructor in his profession at Harvard 1901-3, and became professor in the last named year. He has published 'Park System of the District of Columbia' (1902).

**Olmsted, John Charles**, American landscape architect, nephew of F. L. Olmsted (q.v.): b. Geneva, Switzerland, 14 Sept. 1852. He was graduated from the Sheffield Scientific School of Yale University in 1875 and studied landscape gardening under his uncle. With his partners he has designed parks in Cambridge, Mass., Hartford, Conn., Newport, R. I., and elsewhere, and with F. L. Olmsted since 1875 has designed many parks and private country seats.

**Olmütz, Ol'müts**, Austria, a city of Moravia, 38 miles northeast of Brünn, on the March, which almost encircles it. Since 1886 the defensive works have given place to promenades and pleasure-grounds. It has a fine Gothic cathedral erected in 1306; one or two other interesting churches; a remarkably fine townhouse, the ancient residence of the archbishops; several good modern educational buildings, etc. Its industries and trade are unimportant. Olmütz is the see of an archbishop, and the seat of several courts and public offices. It formerly possessed a university, but this is now abolished except the theological faculty, connected with which is a library of 75,000 volumes. Olmütz was taken by the Swedes, under Torstensen, in 1642, in the Thirty Years' war. Frederick the Great besieged it for seven weeks in 1758 without success. The Conference of Olmütz was held here 28-29 Feb. 1850, between Russia and



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Austria respecting the affairs of Germany and especially in reference to the revolts in Hesse and Schleswig-Holstein against their rulers, the Elector of Hesse and the King of Denmark. By the mediation of Russia, Schleswig-Holstein was given to Denmark, and the Elector of Hesse was reinstated.

**Olney, ōl'nī, Jesse**, American geographer and educator: b. Union, Conn., 12 Oct. 1798; d. Stratford, Conn., 31 July 1872. In 1828 he published 'A Geography and Atlas,' which was a standard work for 30 years, and effected a revolution in the methods of teaching geography. He taught school in New York State and Hartford, Conn., sat in the Connecticut legislature for ten terms and in 1867 became State comptroller. He published 'The National Preceptor' (1831); a series of text-books (1831-52), including a series of 'Readers,' a 'Common School Arithmetic,' a 'History of the United States,' and a volume of poems, 'Psalms of Life.'

**Olney, Richard**, American lawyer and politician: b. Oxford, Mass., 15 Sept. 1835. He was graduated from Brown University in 1856 and from the Harvard Law School in 1858. In 1859 he was admitted to the bar and practised law in Boston, being particularly successful as the chief counsel for the Boston & Maine and other railroads. In 1874 he was elected on the Democratic ticket to the Massachusetts legislature, but was not especially active in politics. In 1893 he was appointed attorney-general by President Cleveland, and was instrumental in breaking the railroad strike of 1894, by obtaining an injunction against the strikers from the United States circuit court of Illinois, enjoining them from interfering with interstate commerce and the United States mails. This injunction was enforced by the use of national troops, and was sustained by a decision of the Supreme Court, it being the first case of "government by injunction" (q.v.) in case of a strike. In 1895 he became secretary of state, in which position he had charge of negotiations with England in regard to the boundary dispute with Venezuela; and wrote a remarkable official note, sustaining the right of the United States to interfere and giving a wide interpretation to the Monroe Doctrine (q.v.). In 1896 he withdrew from the Democratic party on account of the free silver plank in the platform, but in 1900 he supported Mr. Bryan, publicly declaring his reason for so doing to be because he could not support the Republican policy in regard to the tariff, trusts, and imperialism. In 1903 he was prominently mentioned as Democratic presidential candidate in 1904.

**Olney, Ill.**, city, county-seat of Richmond County; on the Illinois C., the Baltimore & O. S. W. R.R.'s; about 115 miles east of Saint Louis. It was settled in 1843. It is in an agricultural region. The chief manufactures are flour, brick, and tile, and dairy products. It has a large trade in its manufactures, and in hay, seeds, and fruits. It has a sanatorium and a free public library. The government is vested in a mayor, who holds office two years, and a council. Pop. (1890) 3,831; (1900) 4,260; (1910) 5,011.

**Olonez, ō-lō-nēs'**, Russia, a northern government bounded north and east by Archangel; southeast by Vologda, south by Novgorod,

southwest by Saint Petersburg and Lake Ladoga, and west by Finland; area, 57,439 square miles. The administrative headquarters is Petrozavodsk. The surface of this government is generally flat; although in the northwest some hills occur, while part of the south is traversed by the ridge which forms the water-shed between the basins of the Baltic and the Volga. The most marked natural feature is the large number of lakes, streams, and morasses. The number of lakes—one of them, Onega, nearly 5,000 square miles in superficial extent—has been calculated at 1,500. The climate is rigorous. The winter is long, the summer heat, though of short duration, great. Timber constitutes an important part of the wealth of the government; porphyry and marble are extensively quarried between Lakes Ladoga and Onega; iron-ores and copper are worked; and hemp and flax thrive in many of the swampy districts. The chief means of support of the inhabitants are forestry, hunting, and fishing. The principal manufacture is that of leather. Education is very backward. Pop. about 375,000.

**Olssen, ōl'sēn, William Whittingham**, American Episcopal clergyman: b. New York 11 May 1827. He was graduated from Columbia in 1846 and from the General Theological Seminary in 1849, and entered the Episcopal ministry the next year. He was rector of St. James' Church, Scarsdale, N. Y., 1851-71; and from 1871 to 1901 held several professorships at St. Stephen's College, Annandale, N. Y., retiring in 1901. He published: 'Personality: Human and Divine' (1882); 'Revelation: Universal and Special' (1885); 'Sermons' (1903).

**Olsson, ōl'sōn, Olof**, Swedish Lutheran clergyman and educator: b. Björtorp, Sweden, 31 March 1841; d. 1900. He was educated at the University of Upsala, entered the Lutheran ministry in 1863, and came to this country in 1869. He was professor of Augustana College, Rock Island, Ill., 1877-88, and after holding a pastorate at Woodhull, Ill., in the interior, returned to Augustana College in 1891 as its president. He edited two Swedish journals, and published 'At the Cross'; 'Greetings from Afar'; travels in England and Germany' (1880); 'The Christian Hope' (1887), works which have been translated into Swedish and Norwegian.

**Olustee, ō-lūs'tē, or Ocean Pond, Battle of**, the most sanguinary battle of the Civil War in point of numbers. On 5 Feb. 1864 Gen. Gillmore, commanding Department of the South, ordered Gen. Seymour to embark about 6,000 men in transports at Hilton Head and sail for Jacksonville, Fla. The transports were accompanied by five gunboats under command of Admiral Dahlgren. The objects of the expedition were to procure an outlet for cotton and lumber; to cut off one of the enemy's sources of commissary supplies, beef cattle; to obtain recruits for colored regiments; and to inaugurate measures for the speedy restoration of Florida to her allegiance to the Union, and to assist in the latter purpose, John Hay, President Lincoln's private secretary, was given a military commission and accompanied the expedition. Seymour arrived at Jacksonville on the 7th, dispersed a small guard, and occupied the place. On the afternoon of the 8th Col. Guy V. Henry, with cavalry and mounted infantry, moved out about eight miles, and late in the evening surprised about



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350 cavalry, under Lieut.-Col. McCormick at Camp Finegan. They were about retiring as Henry charged them, who then followed, capturing four guns, with caissons. Henry reached Baldwin, 20 miles from Jacksonville, on the 9th, where he captured another gun, and a considerable quantity of cotton. Baldwin was at the junction of the two railroads from Jacksonville and Fernandina. On the 10th Henry advanced to Little Saint Mary's and encountered Maj. Harrison, with two companies of cavalry, and drove him with slight loss on either side, and then marched to Sanderson's, thence to within three miles of Lake City, where on the 11th he had a skirmish with the Confederates, and under Seymour's order fell back to Barber's at the South Fork of the Saint Mary's, where Seymour concentrated his entire command, and where he had received orders from Gillmore not to risk a repulse in advancing on Lake City, but to hold Sanderson's, unless there were reasons for falling back. Seymour was delayed for want of transportation, but on the morning of 20 February left his camp at Barber's with the intention of advancing on Lake City and, if successful, of destroying the railroad communication between east and west Florida at the Suwanee River. He had the mounted brigade of Col. Henry, the three infantry brigades of Cols. J. R. Hawley, W. B. Barton, and James Montgomery, and three batteries of artillery, in all about 5,500 men and 16 guns. When Seymour landed at Jacksonville, Gen. Joseph Finegan, the Confederate commander in east Florida, had an insignificant force to oppose to him, but by the 13th had collected at Lake City about 4,600 infantry, 600 cavalry, and three batteries of 12 guns. Col. C. Smith commanded the cavalry, and Gen. A. H. Colquitt and Col. G. P. Harrison the two infantry brigades. Thirteen miles east of Lake City Finegan threw up defensive works, a short distance east of Olustee station, crossing the railroad, the left near Ocean Pond, the right near a bay or jungle. Smith's cavalry, supported by two regiments of infantry, was sent to the front to skirmish with Seymour's advance and draw it on to the intrenched line. Col. Henry, with his mounted force, the 7th Connecticut infantry, and Elder's battery, led Seymour's advance, and after a march of 15 miles, about 3 p.m. came upon Smith's pickets. Two companies of the 7th Connecticut, of Hawley's brigade, were deployed as skirmishers, and drove them back upon their supports, which opened fire, Elder's battery was pushed forward and opened fire, the rest of the 7th Connecticut was deployed and developed the Confederate position, and Henry's cavalry was disposed on the flanks. The ground was favorable for the movement of troops. It was level and, although covered with pine timber, was free from underbrush. Colquitt, with three regiments of his brigade, had been sent forward to support Smith and take command at the front, and had quickly formed line with his infantry, sending the cavalry to the left. This was the line that the 7th Connecticut developed, upon which Seymour massed his artillery in the centre, and sent the 7th New Hampshire to turn the Confederate left, but the regiment got confused in its movement and, coming under a heavy and deadly fire, broke in disorder and was with difficulty rallied to take part in the action at a later hour.

The 8th United States colored infantry became hotly engaged on the left, its commanding officer was mortally wounded, and more than half its men had fallen, when the remainder retreated in disorder. Colquitt's men advanced and delivered a very close and telling fire upon the artillery, shooting down men and horses, but were checked by the unremitting fire of the guns and by Barton's and Montgomery's brigades, now brought up, and under whose fire the left of the Confederate line began to fall back. Meanwhile Finegan had sent everything to reinforce Colquitt, and on both sides the entire forces, except the cavalry, were desperately engaged, the struggle continuing until dusk, when Seymour withdrew, abandoning his dead and many wounded, and five guns, whose horses had been shot. He was pursued about two miles that day, and withdrew in good order to Sanderson's and thence to the Saint Mary's and Jacksonville. The forces numbered about 5,100 on each side. The Union loss was 203 killed, 1,152 wounded, and 506 missing. The Confederate loss was 93 killed, 847 wounded, and 6 missing. Consult: 'Official Records,' Vol. XXXV.; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV. E. A. CARMAN.

**Olympia**, ô-lím'pî-ä, a valley or plain lying in the middle of ancient Elis, in the western part of the Peloponnesus (Morea). Here were collected thousands of statues of the gods and of victors in the games, treasure-houses full of votive offerings, temples, altars, tombs, and in a word the most precious treasures of Grecian art. The elder Pliny states that in his time the statues were as many as 3,000 in number. Here also were preserved important public and private documents, treatises, and inscriptions of all kinds. The Altis (an old Elean form of *alsos*, a grove), in which were situated the Olympiëum or great temple of Zeus, containing the colossal statue of the god by Phidias, the Heræum or temple of Hera, the Metroon or temple of the mother of the gods, the treasuries of the different states which had sent votive offerings to the Olympian Zeus; the Prytaneum, in which the Olympic victors dined after the contests were finished; the Bouleuterion, in which all the regulations regarding the games were made, and other buildings and sacred objects, formed a quadrangle surrounded with walls, and having a length of about 1,800 feet and a breadth of 1,500; and the Exedra, a splendid building containing the reservoir of an aqueduct, erected by the Athenian orator and statesman Herodes Atticus, and furnished by him with statues of the families of the emperors Antoninus Pius and Marcus Aurelius, and by the Eleans out of gratitude to the builder with statues of the family of Atticus himself. On the north it was bordered by rocky but gently swelling hills, the most southern of which was called Mount Cronius, or the Hill of Kronos. On the south it extended almost to the river Alpheius, and on the west it stretched to the Cladeus, a tributary of the former. Outside the walls, but in the immediate neighborhood of the Altis, were the hippodrome, or race-course for chariots and for single horses; the stadium or foot-race course; a theatre, and a gymnasium. After being buried for ages under the soil washed down from the higher grounds, and conveyed by the inundations of the two streams between which it lies, the plain of Olympia has

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again been brought to view by a series of excavations begun in 1875 by the German government at the instigation of Ernst Curtius, and continued till the spring of 1881. Nearly all the buildings above mentioned have been discovered, but unfortunately all in a much injured condition. Thousands of fragments of sculpture, bronzes, coins, terra-cottas, as well as numerous coins and inscriptions, are also among the discoveries. The originals are all to remain in the possession of Greece, but Germany bargained for the right to take the first casts from them, and a museum of Olympian casts and duplicates has been formed at Berlin.

**Olympia**, Wash., city, capital of the State of Washington, county-seat of Thurston County; on Budds Inlet at the mouth of Deschutes River, and on the Northern Pacific railroad. The inlet is at the head of Puget's Sound, and the city has steamer communication with Tacoma, Seattle, Victoria, and other places on the Sound and on the Pacific coast. It was settled in 1846 and chartered as a city in 1859, the year Washington was admitted as a State. It is the commercial centre of a region in which there are extensive lumber and agricultural interests, also fishing and to some extent mining. Large quantities of oysters are shipped from Olympia. Deschutes River has here several falls, three quite large, which in all have a descent of about 85 feet. The water-power contributes toward making Olympia a manufacturing city. The chief manufacturing establishments are lumber mills, salmon canneries, a brewery, iron works, machine shops, cooperages, and cold storage plants. It has an extensive trade in lumber and lumber products, and in farm products, fruits, its own manufactures, and oysters. The principal buildings are the State Capitol, built at a cost of \$400,000, the county court-house, some of the bank buildings and business blocks. It has Saint Peter's Hospital (R.C.), Saint Amable Academy, public and parish schools, and the State Library, which contains nearly 30,000 volumes. Pop. (1910) 6,996.

**Olympiad**, in ancient Greece, the computation of time based on the period of four years between each celebration of the Olympic games (q.v.). The historian Timæus is said to have been the first to adopt this mode of reckoning time, and later Greek historians almost all followed his example. In reckoning by this era the year in which Coræbus gained the victory in the foot-race, corresponding to 776 B.C. of the Christian era, was taken as the first year of the first Olympiad. This mode of reckoning ceased when the games were abolished in 394 A.D., the second year of the 293d Olympiad. The interval between two Olympiads was four of our years, or a Greek *pentaeteris* of 48 moons and two intercalary months. To reduce from the Olympic to the Christian era, multiply the next number below the given Olympiad by four, and add the number of the year in the given Olympiad, if the sum is 776 or less, subtract it from 777, and the remainder is the year B.C.; if it is greater than 776, subtract that number from it, and the remainder is the year A.D.

**Olympias**, first wife of Philip II. of Macedonia and mother of Alexander the Great; d. 316 B.C. She was put away by Philip so that he might marry Cleopatra, a niece of King Attalus.

Olympias may have been cognizant of the plot against Philip's life which resulted in his death in 336. She played no part in politics during Alexander's rule, but about 319 regained a part in the government and acted so cruelly that she was besieged at Pydna by Cassander, who put her to death upon capturing the city.

**Olympic Games**, in ancient Greece, a general name given one of the four great national festivals. The games were usually celebrated on the plain of Olympia, and were sacred to the Olympian Zeus, who had a temple and statue there. The festival was a quadrennial one; the period elapsing between two celebrations was called an Olympiad. Their origin reaches back into a remote antiquity, prior to the commencement of the historical era in Greece, and by the Greeks themselves was attributed in various traditions to a divine source. The season of the year at which the games were held was about midsummer. In later times, when the contests were numerous, they lasted five days, and the fourth day of the festival was the day on which the first full moon after midsummer fell, and therefore, according to the Greek mode of dividing the year, the 14th day of the month. The games thus lasted from the 11th to the 15th inclusive. The number of the judges varied at different times, but ultimately was fixed at eight. Their decision was not final, but might be revised by the senate. Under the judges was a set of police called *Alytæ*, who kept order during the celebration of the games. None but Greeks of pure descent were allowed at any time to take part in the games, until the conquest of Greece by the Romans, when they also were admitted to the contests. If, however, a man could boast of pure Hellenic blood, it did not matter to what city he belonged, or whether he was rich or poor, he had in any case an equal right to be recognized as a competitor, provided he complied with the regulations of the judges. Barbarians were permitted to be spectators of the games, but slaves were not allowed even this privilege. Women also were entirely excluded, and were not even allowed to cross the Alpheus while the games were going on. For the first 13 Olympiads there was only one contest, a foot-race. In course of time the number of contests increased to 24, including shorter and longer foot-races, wrestling, boxing, chariot-racing, horse-racing, foot-racing in heavy armor, chariot-racing with mules, and games for boys corresponding to most of those in which men engaged. The prize awarded to the victor was merely a garland of wild olive, but the honor of gaining such a prize was so highly esteemed that a victor in the Olympic games was regarded as bringing glory not only to himself but to his family, and even the city or state to which he belonged. The victor received his crown standing on a table made of ivory and gold. His own name, and that of his father, and his native state, were proclaimed by a herald to the assembled multitudes. The celebration was concluded by religious ceremonies and processions, and by banquets in honor of the victors. On returning to his native city the victor was honored with a triumphal procession, and heard his praises celebrated in lyric verse, which was sometimes the production of the greatest poets of the time. In addition to this, special privileges

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were usually conferred on them for life. A place of honor was allowed them in all public assemblies, statues were erected to them, and so forth. At Athens they were maintained for the rest of their life at the public cost.

The ancient Olympic games died out during the fourth century A.D. and were not revived until 1896, when the first of a new series, the "Modern Olympic Games," were played in Athens in a stadium especially built for the purpose. Great interest has been manifested in this revival, and contestants from all the principal countries enter the lists at each Olympiad, or four-year period. Many features of the ancient procedure are kept intact, as far as possible, but with modern modifications and additions.

The best records in the principal events, previous to 1911, were as follows:

100-Meter Run — Jarvis (America), 10 4-5s., Paris, 1900; Walker (So. Africa), 10 4-5s., London, 1908.  
200-Meter Run — Hahn (America), 21 3-5s., St. Louis, 1904; Tewksbury (America), 22 1-5s., Paris, 1900; Kerr (Canada), 22 2-5s., London, 1908.

Running Triple Jump — Ahearne (England), 48 ft. 11 1-4 in., London, 1908.  
Standing Broad Jump — Ewry (America), 11 ft. 4 7-8 in., St. Louis, 1904, and 10 ft. 11 1-4 in., London, 1906.  
Standing High Jump — Ewry (America), 5 ft. 5 in., Paris, 1900.  
Pole Vault — Gilbert and Cook (America), 12 ft. 2 in., London, 1908.  
Shot Put — Rose (America), 48 ft. 7 in., St. Louis, 1904, and 46 ft. 7 1-2 in., London, 1908; Sheldon (America), 46 ft. 3 1-8 in., Paris, 1900.  
Discus — Sheridan (America), 136 ft. 1-3 in., Athens, 1906, and 134 ft. 2 in., London, 1908.  
Throwing 16-lb. Hammer — Flanagan (America), 170 ft. 4 1-4 in., London, 1908.  
Marathon Race — Sherring (Canada), 2h. 51m. 23 3-5s., Athens, 1906; Hayes (America), 2h. 55m. 18s., London, 1908; S. Louis (Greece), 2h. 55m. 20s., Paris, 1896.  
Pentathlon — Mellander (Sweden), 24 points, Athens, 1906.

The 1911 meet was held in July, 1912, at Stockholm, Sweden, and was most successful. The scores of the American athletes (85 points) were far in the lead and nearly as great as those of all other nations combined. The following tables give events and winners:

### RESULTS OF OLYMPIC TRACK AND FIELD CONTESTS, 1912. TRACK EVENTS.

EVENT.	First.	Second.	Time.
100 meter dash.....	Ralph Craig, United States.	Alvah T. Meyer, United States.	0:10 4-5
800 meter run.....	J. E. Meredith, United States.	Mel. Sheppard, United States.	1:51 9-10
1,500 meter run.....	A. N. S. Jackson, England.	A. R. Kiviat, United States.	3:56 4-5
10,000 meter run.....	H. Kolehmainen, Finland.	L. Tewanina, United States.	31:20
400 meter relay.....	England.	Sweden.	0:42 4-10
5,000 meter run.....	H. Kolehmainen, Finland.	J. Bouin, France.	14:36 3-5
200 meter dash.....	Ralph Craig, United States.	D. Lippincott, United States.	0:21 7-10
10,000 meter walk.....	G. Goulding, Canada.	E. J. Webb, England.	46:28 2-5
110 meter hurdles.....	F. W. Kelly, United States.	J. J. Wendell, United States.	0:15 1-10
400 meter run.....	C. R. Reidpath, United States.	Hans Braun, Germany.	0:48 1-5
Marathon run.....	K. K. McArthur, South Africa.	C. W. Gitsshaw, South Africa.	2:36:00
3,000 meter team race.....	United States.	Sweden.	
Pentathlon.....	James Thorpe, United States.	P. R. Bie, Norway.	
Cross-country, individual.....	H. Kolehmainen, Finland.	Anderson, Sweden.	
Cross-country, team.....	Sweden.	Finland.	
1,600 meter relay.....	United States.	France.	3:16 3-5
Decathlon.....	J. Thorpe, U. S., 8412 points.	H. Weislander, Sweden, 7724.	

### FIELD EVENTS.

EVENT.	First.	Second.
Running high jump.....	A. W. Richard, U. S., 6 ft. 3 1/2 in.	Lische, Germany, 6 ft. 3 1-10 in.
Standing broad jump.....	Tsichtiras, Greece, 11 ft. 7-10 in.	P. Adams, United States, 11 ft.
16-pound shot.....	P. McDonald, United States, 50.32 ft.	R. Rose, United States, 50.03 ft.
Javelin (best hand).....	E. Lemming, Sweden, 108.4 ft.	J. J. Saaristo, Finland.
Javelin (both hands).....	J. J. Saaristo, Finland, 358 ft. 11 in.	Sukaniemi, Finland, 358 ft. 9 in.
16-pound shot (both hands).....	R. Rose, United States, 90 ft. 5 1/2 in.	P. McDonald, United States, 90 ft. 3 1/2 in.
Pole vault.....	H. S. Babcock, United States, 12 ft. 11 1/2 in.	M. S. Wright, United States.
Running broad jump.....	A. L. Outterson, United States, 24 ft. 11 in.	C. D. Bricker, Canada, 23 ft. 1 in.
Discus (best hand).....	A. R. Taipale, Finland, 148 ft. 1 1/2 in.	R. L. Byrd, United States, 138 ft. 9 1/2 in.
Standing high jump.....	Platt Adams, United States, 5 ft. 4 in.	B. W. Adams, United States, 5 ft. 3 in.
Discus (both hands).....	A. R. Taipale, Finland, 271 ft. 9 1/2 in.	E. Niklander, Finland, 255 ft. 9 1/2 in.
Hammer throw.....	M. J. McGrath, United States, 180 ft. 5 in.	D. Gillis, Canada, 158 ft. 9 1-10 in.
Hop, step and jump.....	G. Lindblom, Sweden, 48 ft. 5 1-10 in.	G. Aberg, Sweden.

400-Meter Run — Hillman (America), 49 1-5s., St. Louis, 1904; Long (America), 49 2-5s., Paris, 1900.  
800-Meter Run — Lightbody (America), 1m. 56s., St. Louis, 1904; Sheppard (America), 1m. 52 1-5s., London, 1908.  
1500-Meter Run — Sheppard (America), 4m. 3 2-5s., London, 1908; Lightbody (America), 4m. 5 2-5s., St. Louis, 1904; Bennett (England), 4m. 6s., Paris, 1900.  
110-Meter Hurdles — Smithson (America), 15s., London, 1908.  
200-Meter Hurdles — Hillman (America), 25 3-5s., St. Louis, 1904.  
400-Meter Hurdles — Hillman (America), 53s., St. Louis, 1904; Bacon (America), 55s., London, 1908.  
Running High Jump — Porter (America), 6 ft. 3 in., London, 1908; Baxter (America), 6 2 4-5 in., Paris, 1900.  
Running Long Jump — Irons (America), 34 ft. 6 1-2 in., London, 1908.

**Olym'pus**, a mountain situated in Thessaly, at the eastern extremity of the range called the Cambunian Mountains. It is now generally called by the Greeks Elymbos or Olymbos. The Turks call it Semavat-Evi, the abode of the celestials. It rises to the height of 9,794 feet, being the highest mountain in Greece. The earliest Greeks looked upon it as the highest of all mountains, and as the central point of the earth's surface. The gods of Homer dwelt on its summit. In after times the gods were said to reside in the exterior sphere of the heavens, above the firmament, and this seat of the blessed received the name of Olympus. Hence the gods themselves were called Olympian gods, and, as

## OLYNTHUS—OMAHA

such, formed a body of which Zeus was the head. The 12 great gods composed the council in Olympus, and the others the general assembly. They did not dwell together, but separate in several mansions built upon the different heights of the many-peaked Olympus. At the highest summit stood the palace of Zeus, where all assemblies and feasts were held. From thence he could look down upon the earth, fill the heavens with clouds, and hurl his thunderbolts.

**Olynthus**, ô-lin'thūs, now **Ais Mamas**, Saloniki, Turkey, an ancient town of Chalcidice, Macedonia, at the head of the Toronaic Gulf, the modern Gulf of Cassandra. It was early inhabited by Greeks, was taken by the Persians under Artabazus, one of the generals of Xerxes, was next subject to Athens, and regained its independence when the Spartan general Brasidas extinguished the Athenian power in Chalcidice. From its excellent maritime position, it grew in wealth and importance, until, becoming too powerful, the Spartans captured it in 379 B.C. In 352 the Olynthians formed an alliance with the Athenians, which provoked the hostility of Philip of Macedon, and in 347 the city was betrayed to him, the citizens were enslaved, and every building was demolished.

**Olyphant**, ôl'f-fant, Pa., borough in Lackawanna County; on the Lackawanna River, and on the New York, O. & W. and the Delaware & H. R.R.'s; about six miles above Scranton. It was settled in 1857 and incorporated in 1877. It is in the anthracite region, and its chief industries are connected with mining and shipping coal. It manufactures blasting powder, and has machine-shops and iron works. Its chief trade is in coal. The government is vested in a burgess, who holds office three years, and a council. The borough owns and operates the electric-light plant. Pop. (1890) 4,083; (1900) 6,180; (1910) 8,505.

**Olyphant, Robert Morrison**; b. New York, 9 Sept. 1824. He was graduated at Columbia University in 1842 and entered the railroad business in which he held many important positions, among which was the chairmanship of the executive committee and member of the board of managers of the Delaware and Hudson Company; director of the Cooperstown and Charlotte Valley R.R., the Champlain Transportation Company, the Chateaufort and Lake Placid Ry. Co., the Chateaufort Iron and Ore Co., and the Lake George Steamboat Co.

**Om**, ôm, a Sanskrit word to which the Hindu religion attaches peculiar sanctity. It is pronounced at the beginning and end of every lesson in the Veda, and is also the introductory word of the Puranas. In the Vedas it is said to comprehend all the gods.

**Om Mani Padme Hum**, ôm mā'nē pād'mē hoom, in the Buddhist religion, a sacred formula, known as the "formula of six syllables," used especially in Lamaism. Among the Tibetans and the Mongols it is repeated on all occasions, important and unimportant, and is found written on all sorts of objects on which inscriptions can be made. It is the first thing which a child learns to repeat. When written in the form of a monogram its sacred character is exalted. The formula is explained to mean

either, "Oh, the jewel in the lotus: Amen"; or "Salvation in the jewel-lotus: Amen," referring to the deified saint Avalokites'wara or Padmapāni, the reputed author of the formula, who was believed to have been born from a lotus. In later times a mystical meaning was given to each of the six syllables composing the phrase.

**Omaguas**, a people of Peru, whose capital was said to be El Dorado. Their territory is now greatly restricted, and the people themselves are much reduced in numbers; but the Omagua language, which belongs to the Tupi-Guarani language, is still spoken even outside the limits of the original tribal boundaries.

**Omaha**, ô'ma-ha, Neb., the largest city in the State and county-seat of Douglas County, is situated on a slightly restricted, and the people themselves are much reduced in numbers; but the Omagua language, which belongs to the Tupi-Guarani language, is still spoken even outside the limits of the original tribal boundaries.

**History**.—It was not until March 1854 that a treaty was concluded with the Otoes, Missouris and Omaha Indians, ratified 21 June, and promulgated 24 June, whereby the title of the Indians was surrendered, and left the land to be taken up and enjoyed by the white men. In the spring of 1854 some settlers arrived and the first building was erected. The first general election in the Territory was held 20 Dec. 1854, and on 16 Jan. 1855 the first Legislative Assembly was convened at Omaha, and on 24 January commenced a contest (which lasted for 12 years), when the member from Cass County gave notice that, at an early day, he would introduce a bill to locate the capital of Nebraska. The struggle was long and bitter, often at the expense of needed legislation, producing much ill feeling, and was more troublesome to manage than any question the Legislature had been called upon to decide. After a long debate upon the proposition of the member from Cass, the question was decided in favor of Omaha by a vote of 14 to 11 in the lower house, only to be renewed at every subsequent meeting of the Legislature, until Nebraska became a State, when the capital was removed to Lincoln. On 2 Feb. 1857, by an act of the Legislature, Omaha became an incorporated city, it having been up to this time a county organization, and an election was held on the first Monday in March in that year, when a mayor, nine aldermen and other city officers were elected. The council held its first session 6 March. Under the direction of the council the mayor proved up the claim of the city, east of the 6th principal meridian, and the same was surveyed and laid out into city lots, streets and alleys.

The discovery of gold in Colorado in 1858 made Omaha the best point for outfitting for the mines. The streets were filled with emigrants on the way to the gold fields, and daily trains left to cross the plains in search of gold. At the breaking out of the Civil War Omaha was made military headquarters, which greatly increased its business and importance. From the day that President Lincoln decided that the initial point of the Pacific Railroad should be "at

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a point on the western boundary of Iowa, opposite section 10, township 15, north of range 13, east of the 6th principal meridian in the State of Nebraska," the success of Omaha was assured, and from a city of 320 blocks it has grown to one of 24 square miles.

**Government.**—The city is divided into nine wards, the Government being confided to a mayor, city council, composed of two aldermen from each ward, an advisory board of eight members, board of public works (three members), board of public health (four members), park commission (five members), and board of fire and police, with five members. The police department consists of a chief of police and 102 men. The fire department is under the charge of a chief and two assistants, and has four steam fire engines, three hook and ladders, eight hose companies and one water tower.

**Public Parks.**—The chief suburban attractions of the city are its parks, seven in number, which are connected by a boulevard system. Hanscom Park, the oldest, contains 60 acres. Riverview, in the bluffs overlooking the Missouri, contains 70 acres. Bemis Park contains 10 acres; Elmwood contains 215 acres; Miller Park, 80 acres, and Fontenelle Park, 110 acres. Prospect Hill Cemetery is located in the northwest part of the city on high and eligible ground. Forest Lawn is situated seven miles northwest of business centre of city; others are Mount Hope Cemetery, Jewish Cemetery, Bohemian, Ever-Green, Springwell, Holy Sepulchre, Saint Mary's and Cassidy's Roman Catholic Cemeteries.

**Buildings.**—The Douglas County Court House, a stone structure in Farnam Street, was completed in 1885 and is admirably adapted for the purpose for which it was erected. The cost of the building, land and furniture, was about \$225,000. The Omaha *Bee* Building was completed in 1889, an imposing substantial building of stone and pressed brick, seven stories in height, covering an area of 132 square feet. The New York Life Insurance Co. Building, a ten story edifice of brick and stone, is one of the land marks of the city, and was erected at an expense of \$1,000,000. The Paxton Block was completed in 1888 at a cost of \$361,000; in the same year the Barker Block and Granit Block were erected at a cost respectively of \$70,000 and \$40,000. Boyd's Theatre is a structure of stone, iron and pressed brick, has a seating capacity of 2,000 and cost \$250,000. The City-hall, seven stories in height, is the home of all the city officers, and is one of the best arranged structures in the West. It was erected at a cost of \$550,000. The United States Custom-house, Post-office and Court-house, was commenced in 1892, and is completed at an expense of \$1,845,000. It is of the Romanesque style of architecture. The main entrance is on 16th Street, with a loggia 15 by 50 feet enclosed by a balustrade, has a façade of five arches, embellished by polished granite pilars. The first floor is devoted exclusively to the post-office; the second floor is occupied by the customs, internal revenue, district attorney's office, railway mail service, and rural free delivery service; the third floor is used as United States district and circuit court rooms, United States marshal, pension agent and witnesses rooms; the fourth

has rooms for grand and petit juries, weather bureau and civil service, with dormitories for railway clerks.

**Churches.**—Omaha is the see of the Roman Catholic and of the Protestant Episcopal churches. The latter has a fine stone cathedral building costing \$60,000, with a chime of eight bells. There are in the city, 9 Baptist organizations; 3 Christian; 8 Congregational; 6 Evangelical; 1 Free Methodist; 3 Hebrew synagogues; 12 Lutheran; 13 Methodist Episcopal; 14 Presbyterian; 10 Protestant Episcopal; 2 United Presbyterian; 12 Roman Catholic; 1 Unitarian; 1 Christian Scientist; 1 Latter Day Saints; 1 Seventh Day Adventist; 1 Salvation Army; 1 Volunteers of America; 1 Universalist.

**Charities.**—These institutions include the Creche, the Childs Savings Institute, Immanuel Orphan Home, Clarkson Memorial Hospital, Convent of Mercy, County Hospital, the Nebraska Institute for the Deaf, and the Roman Catholic Orphan Asylum. Saint Joseph's Hospital of three stories and basement and costing \$150,000, is known as "The Creighton Memorial," the name of its chief donor. The Bishop Clarkson Memorial Hospital was established in 1881, and its new building was completed in 1884.

**Finances.**—Ten years ago Omaha had 10 National banks. These were the First National, Omaha National, Merchants' National, Commercial National, U. S. National, Nebraska National, Union National, South Omaha National, United States Stock Yards National, and the Packers' National, having an aggregate capital of \$3,100,000, and deposits aggregating about \$35,000,000. In 1910 two of Omaha's banks were depositories for State funds, the City National and the Corn Exchange each holding \$42,500 of the State's money. In 1910 the city had a net public debt of \$5,820,000. The assessed valuation of real estate was \$92,345,090; of personal property, \$53,460,235; total, \$145,805,325. The tax rate was \$11.74 on a 20 per cent valuation.

**Libraries.**—The libraries are those of the New York Life Insurance Company, Law Library (2,500 volumes); Omaha Public Library (65,000 volumes); the library of Young Men's Christian Association; two Catholic libraries at Creighton College, one for the use of the faculty (8,000 volumes, being composed in part of rare and old books and manuscripts of the 15th, 16th, and 17th centuries); the other for the use of the students (12,000 volumes). The Masons, Odd Fellows, Swedish, Danish, and Bohemian societies all have valuable libraries. In October 1888 G. W. Lininger erected an art gallery in the Italian renaissance style, at a cost of \$15,000, in which to house his judicious collection of paintings and other works of art. The present collection is valued at over \$300,000 and consists of old oil paintings, modern oil paintings, water colors, statues and busts, vases and plaques, porcelains, curios and articles of virtu, and the whole is open to view and inspection of the public two days in the week.

**Public Schools.**—The schools of the city are under the control of the board of education, consisting of 15 members elected by the votes of the citizens. Women paying taxes and those who have children of school age vote for the



OMAHA.



VIEW OF CITY FROM HIGH SCHOOL BUILDING.





## OMAHA INDIANS—O'MALLEY

members of the board. The superintendent is appointed by the board. There are 50 school buildings in the city, 49 graded and 1 high school, costing in the aggregate \$1,500,000. The graduates from the high school are admitted to many of the colleges east and west without examination. In addition to the public schools there are many private and parochial schools.

**Industries.**—There are many and diversified industries in Omaha. The first brewery was established in 1859 by Fred Krug, who has remained in the business, and is president of the Frederick Krug Brewing Company, with a capital of \$1,000,000. The cost of their present building and machinery was \$750,000; capacity 200,000 barrels yearly. The Metz Bros. Brewing Company commenced operations in 1864, and occupy a building erected at a cost of \$351,000. The Omaha Brewing Association was organized May 1891, with a capital stock of \$1,000,000. The brewery buildings, etc., cost \$500,000; capacity 150,000 barrels. The Willow Springs Distillery was incorporated in 1872 and is now the third largest establishment of the kind in the United States.

The American Smelting and Refining Company commenced business in October 1870 with a capital of \$60,000. In 1882 the Grant Smelting Company was consolidated with the Omaha Company. A reorganization was completed with a capital of \$2,500,000. They handle silver, lead, copper ores, from the western States, Mexico and British possessions. The business of a single fiscal year of this plant was as follows: 123,515 tons lead, \$9,881,200; 24,806,088.82 ounces silver, \$13,643,348.85; 604,314.79 ounces gold, \$12,491,186.71; 2,142,724 pounds copper, \$257,126.88; 4,017 tons blue vitriol, \$401,900. Omaha is in the centre of the great wheat and corn producing portions of Iowa, Nebraska, Kansas, and Missouri, and the largest cattle and hog productions of the country, are marketed here. For a single year one elevator handled 12,000,000 bushels of corn, oats, and wheat.

**Railroads.**—The geographical position makes Omaha a natural railroad centre. Fourteen great trunk systems, with lines connecting to every part of our country, enter the city, thus bringing it into communication with all parts of the Union. No western city has greater railroad facilities. Within the past few years two magnificent railway stations have been erected, the Union depot at a cost of \$400,000, and the Burlington costing \$500,000. The Missouri River is spanned at Omaha by two railroad bridges, and one motor and wagon bridge. The following are the lines out of Omaha for the East: Chicago, B. & O.; M. & St. P.; C. & N. W.; C. R. Is. P.; Illinois Central; Chicago & Great Western. To the North and Northwest, C. & N. W.; Illinois Central; St. P. M. & O. West and Southwest, B. & M.; U. P.; C. R. Is. P.; K. C., St. L. & C. B.; M. & P. South and West, B. & M.; M. & P.; Wabash; K. C., St. L. & C. B.

**Trade and Commerce.**—Over 300 firms, covering every line of mercantile industry known in the United States are engaged in wholesale and jobbing. The business extends east to the Mississippi River, north to Manitoba, south and southwest to Texas and Mexico, west to the Pacific. Omaha is a port of immediate transportation of foreign goods, which has permitted

the merchants to receive merchandise and pay duties at home without the delay on the sea-board. The value of the jobbing business in 1890 was \$47,000,000, and in 1902, \$95,000,000. The value of productions of factories, industry, packing houses and smelters was (in 1890) \$68,000,000; (in 1902) \$105,000,000. At South Omaha are located the famous packing houses and stockyards, where more than \$30,000,000 have been invested. The daily capacity of killing and preparing for market is 15,000 hogs, 5,000 cattle, and 4,000 sheep. All meats are subjected to careful investigation and chemical analysis by government inspection before shipping.

The live stock receipts at the stockyards are:

	Hogs	Cattle	Sheep	Horses	Total
1890	1,702,723	615,337	153,873	5,007	2,477,002
1902	2,247,428	1,010,815	1,742,539	42,079	5,042,861

**Newspapers.**—The first paper published in Omaha was *The Omaha Arrow*, its initial number being dated 28 July 1854. There are published in 1903, the Morning and Evening *World-Herald*; the Morning and Evening *Bee*; the *Omaha Daily News*; the *Omaha Daily Hotel Reporter*; *Omaha 'Excelsior'*; *'Mercury'*; *'Western Laborer'*; *'Bohemian Voice'*; *'Commercial Exhibit'*; *Omaha 'Tribune'*; *'Pokrok Zapadu'*; *'Svenska Posten'*; *'Swedish Journal Tribune'*; *'Young Men's Journal'*; *'Den Danske Pioneer'*; *'Westliche Presse'*; *'Examiner'*; *'Central Farmer'*; *'Enterprise'*; *'Fraternal Union Advocate'*; *'Nebraska Farmer'*; *'Protector'*; *'Quill'*; *'Royal Woodman and Workers Gazette.'*

**Population.**—(1910) 124,096.

GEORGE L. MILLER.

**Omaha Indians, or Omahas,** a tribe of American Indians of the Dhegiha family residing in eastern Nebraska. The name is derived from an Indian word meaning "those who go up the stream, or against the current." They number about 1,200.

**O'Mahony, 6-mā'6-ní, John Francis,** Irish politician: b. Kilbeheny, County Cork, Ireland, 1816; d. New York 7 Feb. 1877. He was educated at Trinity College, Dublin, and, fired with zeal for Ireland's cause, entered the ranks of the Young Irelanders in 1845 and took part in the insurrection of 1848, after which he was compelled to seek refuge in France. In 1854 he came to the United States. He was active in founding the organization of the Fenian Brotherhood, acted as its president for several years, and though personally taking no part in any of the insurrectionary movements in Canada or Ireland his advice was never withheld. He devoted his later years to literature, but endured great poverty. At his death his body was taken to Ireland, where he was buried with honors in Glasnevin Cemetery, near Dublin. He published: *'History of Ireland by Geoffrey Keating'* (1857), which he translated from the Gaelic and annotated copiously. See Webb, *'Irish Biography'* (1888).

**O'Malley, 6-māl'í, Thaddeus,** Irish Roman Catholic clergyman: b. Garryowen, near Limerick, 1796; d. Dublin 2 Jan. 1877. He was ordained in 1819 and came to America, but through his independent ecclesiastical action was suspended in 1827 and returned to Dublin, where he became assistant at the cathedral under Arch-

bishop Daniel Murray and worked indefatigably for the passage of poor-laws for Ireland. He was appointed by the government rector of the Catholic university at Malta, but because of the reforms introduced by him among the students he was dismissed. In 1845 he founded the 'Social Economist,' and later the 'Federalist,' both of which he used in the interest of Ireland and to unite the Old Ireland and Young Ireland parties. He was often under ecclesiastical censure for the freedom with which he attacked the discipline of the Church; was an earnest advocate of the home-rule movement, and published: 'A Sketch of the State of Popular Education in Holland, Prussia, Belgium, and France' (1840); 'Harmony in Religion' (1870); 'Home Rule the Basis of Federation' (1873); etc. See Webb, 'Irish Biography.'

**Oman, ʾōman, Charles William Chadwick,** English historian: b. Mozufferpore, Bengal, India, 12 Jan. 1860. He was educated at Winchester and Oxford, has been a fellow of All Souls' College, Oxford, from 1883, and deputy professor of modern history at Oxford from 1900. He is the author of: 'A History of Greece' (1888); 'Warwick, the King Maker' (1891); 'A Short History of the Byzantine Empire' (1892); 'A History of Europe 476-918' (1893); 'A Short History of England' (1895); 'History of the Art of War in the Middle Ages' (1898); 'History of the Peninsular War, Vol I., 1807-9' (1902); 'Seven Roman Statesmen' (1902).

**Oman, ʾō-mān,** Arabia, a sultanate at the eastern extremity of the peninsula, generally comprised in the maritime district extending along the Persian Gulf, the Gulf of Oman, and the Arabian Sea, from El Hasa to Merbat, near the Hadramut frontier. Area, 82,000 square miles. Although mainly a maritime kingdom, Oman proper is the richest part of the Arabian peninsula, both in agricultural products and in mineral treasures. The working of gold and silver filigree, with which daggers, belts, cups, and pipes are often adorned in Oman, supports great numbers in the larger towns. The inhabitants are tolerant, but superstitious and immoral. The form of government is a monarchy, limited by a powerful aristocracy with hereditary privileges, and the prescription of popular rights. The ruler is called the Imam or Sultan, and the capital of the state is Muscat (q.v.), a name also given to the sultanate. The present dynasty secured possession of the throne in 1741, and for some time Socotra, Zanzibar, and parts of the east coast of Africa were attached to Oman. A British Resident is stationed at Muscat, the sultanate being virtually a British protectorate. Pop. (est.) 1,500,000.

**Omar I., ʾō-mar,** 2d caliph after Mohammed; d. Medina 3 Nov. 644. See CALIPH.

**Omar II.,** 8th caliph of the Omaides. See CALIPH.

**Omar Khayyām, khī-yām',** Persian poet and scholar: b. Naishāpūr, province of Khorassan, latter part 11th century; d. (according to tradition) 1123 (517 A.H.). His name is given as Ghiās uddin Abul Fath Omar ibn Ibrahim al-Khayyām. The epithet Khayyām, signifying 'tent-maker,' is indicative of his calling previous to the time when he was able

to devote himself to science and literature. Nizām ul Mulk, the great vizir of Al Arslan and Malik Shāh, offered him preferment at court, but he requested instead the means of living in retirement and occupying himself with learning. He accordingly received a pension, and pursued researches especially in mathematics and astronomy. Subsequently he was made astronomer royal at Merv, and in that capacity prepared certain astronomical tables. He was also active in the revision (dating from 15 March 1074) of the ancient Persian calendar, a work comparable to the revision of the Julian calendar by Gregory XIII., to which it was similar in principle, and superior to which it has been ranked by some authorities. Among his mathematical writings are a work on algebra and a study of 'The Difficulties of Euclid's Definitions,' both still preserved. In his religious views he was unorthodox, and therefore viewed with suspicion by many of his contemporaries. He is best known to the West in later times as a poet somewhat in the manner of Lucretius, but more in that of Ecclesiastes. This philosophy he set forth in 'Rubāiyāt' (quatrains), of which, according to convention, the first, second, and last lines rimed (the rime being in many cases even, quintuple), while the third line was for the most part blank but rarely followed the rime of the other lines. Each Rubāi was distinct, and in extant manuscripts is placed in an alphabetical arrangement dependent upon the letter concluding the rime. About 500 quatrains are assigned to Omar; many are probably not his. Perhaps his heretical views had something to do with the fact that a comparatively small number of MSS. exists, and none can be made an authority. The MSS. also vary more or less in the number of quatrains which they include. Edward Fitzgerald made of a selected portion of the quatrains an ingenious mosaic which presents something of unity, but probably gives too consistent a structure to the pessimistic side of Omar. The Persian seems to have been of changeful mood, sometimes humble before Allah, again reproachful or defiant; hopeful and fatalistic; rebellious and a quiescent. He often ridiculed the orthodox, and perhaps he liked to confuse and perplex them. "For this," says Fitzgerald, "he is said to have been especially hated and dreaded by the Sufis." The Sufi poets, however, found it convenient to borrow of Omar, whose material they presented in their own mystic guise. Nevertheless, Omar had training in the Sufi doctrines, and some have detected a symbolic and mystic significance in his work. The generally known rendering into English is that by Fitzgerald (1859; later ed.), whose version was republished (1900) by Batson and Ross with commentary and introduction. There are also translations by Whinfield (2d ed. 1893) in his edition of 500 quatrains, a scholarly work; Payne (1898); and Heron-Allen (1898). There is a volume on the 'Sufi Interpretations of the Quatrains of Omar Khayyām and Fitzgerald' by Bjerregaard (1902). There are numerous versions in other modern languages, and Elihu Vedder published (1884) a series of illustrations which have been much praised.

**Ombay, ʾōm-bī',** or Allor, Malay Archipelago, one of the Sunda Islands, about 20 miles

## OMBRE — OMEN

northwest of Timor, from which the Ombay Pass, in the line of one of the best routes from Europe to China, separates it. It is about 900 square miles in extent, 65 miles long, and 15 broad, and presents a bold coast and lofty interior. The mountains are covered to their summits with lofty trees. It is inhabited by savage tribes, said to be fierce and treacherous, and carries on some trade with Timor in birds' nests and provisions, exchanged for iron-work, Chinese wares and linen, Allor on the northwest and Bailoko on the southeast being the chief settlements and ports. It belongs to the Netherlands, and is included in the residency of Timor.

**Ombre**, òm'bér, a game of cards originating in Spain. It is usually played by three persons, with 40 cards (the eights, nines, and tens having been removed), and each player receives nine cards, three by three. The game is often mentioned in English 18th century literature.

**Omdurman**, òm-door'mân, Sudan, a native town on the White Nile, opposite Khartum. It was built as the capital of the Mahdi's successor, when Khartum was destroyed in 1885, and extends for four miles along the river bank. Under the Khalifa Abdallah it had a population of 500,000 inhabitants, living in one-storied mud huts, lining streets laid out on an orderly system, and guarded by a walled enclosure flanked with towers, accommodating 10,000 warriors. When the Khalifa was defeated, 2 Sept. 1898, Omdurman was hastily deserted, but with returning trade and prosperity has (1904) an estimated population of 60,000. Omdurman is the great mart of the gum-arabic, ivory, and ostrich-feather trade of northeastern Africa, and representatives of over thirty tribes congregate in its markets.

**O'Meara**, ò-mā'ra, Barry Edward, English physician: b. Ireland 1778; d. London 3 June 1836. He was household physician to the Emperor Napoleon I. at Saint Helena, and published 'Napoleon in Exile' (1822). Originally a surgeon in the British navy, he was serving on the *Bellerophon* in that capacity 7 Aug. 1815 when Napoleon went on board. Napoleon noting O'Meara's skill and knowledge of Italian, desired the surgeon to accompany him to Saint Helena. Having obtained Admiral Keith's permission, O'Meara remained with the ex-emperor till July 1818. He was then recalled and deprived of his rank, for having accused Sir Hudson Lowe before the admiralty of cruel and arbitrary conduct.

**Omega**, ò-mē'ga or ò-mēg'a, the last letter of the Greek alphabet; hence, figuratively speaking, the end or last of anything. See **ALPHA**.

**Omen**, a sign believed to prognosticate a future event, between which and the event foretold there appears no relation of cause and effect, but which is usually received as an intimation from a superior power. Omens have been common among most nations, and are often remembered and mentioned after they have ceased to be credited. Though generally classed among superstitions, they may sometimes be founded on some hidden relation in things, some natural law of sequence the ground of which is unknown. They have been chiefly in vogue in the ruder ages and communities, though under the name of auguries they retained their influence

during the whole period of pagan antiquity, and though eminent warriors and other popular leaders in moments of extreme doubt and peril have given notable examples of faith in them. Sneezing was deemed ominous in the time of Homer, and Eustathius states that it was lucky or unlucky according as it was directed to the right or the left. Aristotle discusses the problem why sneezing from noon to midnight is good, and from midnight to noon bad. At noon it was propitious. Among the ancient Persians sneezing was esteemed fortunate, a sign of contest between the fiery soul and the earthly body, and of the victory of the former. When the emperor of Monomotapa sneezes, says Codignas, it is proclaimed through the whole land as a signal for general joy. The itching of the nose implied that a stranger was coming. Burton, in his 'Anatomy of Melancholy,' states that "to bleed three drops at the nose is an ill omen." The spots on the finger nails were all ominous; the itching of the palm of the right hand promised a receipt of money; the doubling of the thumb within the hand was believed to have efficacy in avoiding approaching danger, and therefore the thumbs of dead persons were so folded. The way in which fires, candles, or lamps burned suggested divers omens. The superstition still prevails in many places that the howling of a dog by night presages a death in the neighborhood. Duncan Campbell expresses his faith in this omen, and adds: "Odd and unaccountable as it may seem, those animals scent death, even before it seizes a person." The screeching of the owl and the croaking of the raven have both in ancient and modern times been regarded as omens of some dire calamity. Divers presages concerning the weather have been derived from the habits of birds, bees, wasps, gnats, etc. Pennant states that many of the great families of Scotland received monitions of future events, especially of death, by spectres, wraiths, and shrieks. Fishermen and sailors discover omens in echoes, flashes, shadows, and other visible appearances. To throw a cat overboard, or lose a bucket, is believed to be unlucky. Whistling is supposed to stir up the wind. Stumbling has been the subject of numerous superstitions. Gaius Gracchus stumbled at his threshold on the morning of his death. To stumble on going out, says Bishop Hall, was mischievous; to stumble up stairs, says Grose, was lucky.

At the present day, in many parts of England and the United States, a superstitious belief in omens exists. It is regarded as unlucky to see first one magpie and then more; but two denote marriage or merriment; three, a successful journey; four, an unexpected piece of good news; five, that you will shortly be in a great company. To kill a magpie is to incur some terrible misfortune. When a person goes out on any important business, it is lucky to throw an old shoe after him. To present a knife, scissors, razor, or other sharp or cutting instrument to one's friend is unlucky, as they are apt to divide love and friendship. The falling of salt toward persons at table, the spilling of wine on their clothes, are evil omens. Breaking a looking glass betokens the death of the best friend of the person to whom it belonged. The burning of the cheeks, or tingling of the ears, that others were talking of us; if of the

left cheek or ear, ill; the right, well. A sow crossing the road before a person going on a journey, is believed to indicate a disappointment, if not a bodily accident to such person; but if the sow be attended by her litter of pigs, it denotes a successful journey, etc. See *SUPERSTITION*.

**Omer Pasha**, *ô'mér pāsh'â*, Turkish general: b. in the Austrian village of Plasky 24 Nov. 1806; d. Constantinople 18 April 1871. His real name was Michael Lattas, and his parents were Christians. Educated for the Austrian army, for some unrecorded reason he fled in 1828 to Bosnia, and, embracing Mohammedanism, obtained the post of writing-master to Abd-ul-Medjid, the heir-apparent to the Ottoman throne. In 1842 he was appointed military governor of the Lebanon, in 1843 suppressed an insurrection at Albania, and in the following years others in Bosnia and Kurdistan. He defeated the Russians in 1853 at Oltenitza, again at Silistria in 1854, and entered Bucharest. On 17 Feb. 1855 he repulsed with great loss 40,000 Russians who attacked him at Eupatoria. In October of that year he was sent to relieve Kars, but arrived too late. In September 1861 he was charged with the pacification of Bosnia and Herzegovina, which were again in insurrection. This being accomplished, he attacked the Montenegrins, captured Cetinje, and overran the country in 1862. He was made field-marshal in 1864, was sent to suppress the rebellion in Crete in 1867, and was minister of war from 1869.

**Ommanney, Sir Erasmus**, British admiral: b. London, England, 1814; d. Portsmouth, England, 21 Dec. 1904. He entered the navy at the age of 12, and three years later was present at the landing of the British army at Lisbon. He was at the battle of Navarino, in 1827, on board the Albion, throughout the action, acting as aide-de-camp to the captain, and was the last survivor of that battle, which resulted in the destruction of the Turkish fleet. In 1835 he was promoted to the rank of lieutenant, immediately volunteering to serve with Capt. James Ross in an expedition to relieve whaling vessels beset in the ice in Baffin's Bay, and was commended for his services. Attaining the rank of captain in 1846, he was placed second in command of the Arctic expedition to search for Sir John Franklin (q.v.), and was first to discover traces of the missing ships, later being knighted for these services. In the Crimean war he commanded the British expedition sent to the White Sea to damage Russian ports. Afterward he served on the coast of Central America, his last active command being as senior officer in charge of the naval establishment at Gibraltar. He was a fellow of the Royal Society and a member of the Royal Geographical Society, and was generally known as the "Father of the British Navy."

**Om'nibus**, a Latin word signifying "for all," and now applied in several languages to the well-known vehicle used for the conveyance of passengers at a cheap rate. The famous mathematician, Blaise Pascal, is said to have introduced the vehicle in Paris. Unlike most other men of learning, Pascal was more or less interested in the affairs of practical life. He was the inventor of the push-cart that now per-

ambulates our streets. In 1661 he had large wagons built for regular traffic in the heart of Paris. He allied himself in this undertaking with several influential friends, among whom was the Duke de Roannes. In 1662 Louis XIV. granted letters patent to Pascal, in which it was said that these carriages were intended for the comfort of poor people who had to go to courts of justice, or who were sick and so poor that they could not afford to pay the two pistoles exacted by the chairmen and the drivers of coaches. At first the use of the vehicle was not generally permitted. A royal decree forbade its use by soldiers, pages, lackeys, and other liveried servants, as well as artisans and porters. Pascal, in spite of the fact that he only lived to be 39, is said to have made no inconsiderable sum out of his invention. After the vehicle had been in use for some 16 years, it was abandoned for various reasons. It was not until 1812 that it was again introduced, this time in Bordeaux, which city was followed in 1821 by Nantes and in 1827 by Paris. A Mr. Shillibur started the first omnibus in London in 1829, and they were introduced into New York in 1830, and Amsterdam in 1839.

**Omnibus Bill**. See *COMPROMISE OF 1850*.

**Omophag'ic Rites**, or **Omophagia** (Greek, *ὀμοφαγία* eating raw flesh), religious rites in which uncooked flesh was eaten. In such religious ceremonies cannibalism sometimes formed a part, as in the Orphic rites, in which the passion of Zagreus (q.v.), the infernal Dionysus, was commemorated by the sacrifice of a man, who was dismembered and eaten. These rites were celebrated at Chios and Tenedos, and from them Dionysus obtained the title of eater of raw flesh. Dionysian rights were introduced into Italy about the end of the 3d century B.C., and in 189 B.C. the senate, informed of their nature by a freedman who had been marked out as a victim, issued the decree "Concerning the Bacchanalian Rites," which banished the Orphic mysteries from Italy. A ram or an ox was afterward substituted for a human victim in the Dionysian celebrations. See *DIONYSUS*; *BACCHUS*; *ORPHEUS*.

**Omsk**, Asiatic Russia, the former capital of western Siberia, now capital of the General-Governorship of the Steppes and of the province of Akmolinsk, on the Irtysh, at the confluence of the Om, and on the Trans-Siberian railway, 280 miles southeast of Tobolsk. It has modern fortifications in the form of the regular polygon, flanked with five bastions, and is the most important military station on the line of the Irtysh. It contains a school for interpreters and a military school for the Cossacks. The trade consists in brandy, tobacco, etc. Pop. 37,470.

**Oña, Pedro de**, *pá'drô dâ ô'ñâ*, Chilean poet: b. Confines, Araucania, about 1565; d. Lima about 1620. He was educated at Lima (then Los Reyes del Peru), and there wrote his great epic and apparently his first poem, 'Arauco Domado' ('Chile Conquered,' 1596; re-edited 1849), which is reckoned a Spanish classic, being included in the Spanish Academy's 'Catalogo de Autoridades de la Lengua,' as well as various sonnets and the descriptive poem, 'Temblor de Lima el Año de 1607' ('The Lima Earthquake of 1607,' 1609).

## ONAGER—ONEIDA COMMUNITY

**Onager.** See **ORDNANCE**.

**Onagra'ceæ.** See **EVENING PRIMROSE**.

**Oñate, Juan de,** hoo-än' dā ò-nā'tā, Spanish explorer: b. Guadalajara, Mexico, about 1555; d. about 1615. He was a man of position and influence in the colony, a son of the founder of Guadalajara and married a granddaughter of Cortés. In 1595 permission was granted him by the viceroy Velasco to colonize the district north of the Rio Grande, but Monterey, Velasco's successor, withheld full powers as governor until 1598, when Oñate set out on his expedition with a large force of soldiers and Indians, and many wagons and cattle. He crossed the Rio Grande, founded San Juan, the first capital of New Mexico, and, notwithstanding conflicts with the Indians, the colony flourished. In 1599 and 1604 Oñate explored Arizona, and though records show that he was not governor of the colony after 1608, there is nothing by which to accurately determine the date of his death.

**Onawa,** òn'a-wā, Iowa, town, county-seat of Monona County, within five miles of the Missouri River, on the Illinois C., Chicago & N. W., and Sioux City and P. R.R.'s; 37 miles southeast of Sioux City. It is the centre of an excellent agricultural and stock-raising region and has a considerable local trade. It has public schools and a public library (founded in 1867). Pop. (1910) 2,026.

**Oncarhyn'chus,** the genus of the *Salmonida* which includes the salmon of the North Pacific. See **SALMON**.

**One Hundred Committee,** the name given an organized body of New York citizens, who during the occupation of Manhattan by Lord Howe, were intent upon maintaining their independence. Governor Tryon, the British commander, was so intimidated by the Committee, he feared for his personal safety and took refuge on board a British sloop-of-war. The committee gave courage to the Sons of Liberty who removed the cannon from the royal battery at the foot of Broadway to a place of safety for the use of the people.

**Onega,** òn'ě gā (Russ. ò-nyě'gā), (1) a lake in Russia, near the centre of the government of Olonetz, after Lake Ladoga the largest lake in Europe, covering an area of about 4,900 square miles. It is of irregular shape, has generally rocky shores, and numerous creeks, bays, and islands, and is well supplied with fish; numerous shoals and sand-banks interrupt its navigation. It is fed chiefly by the Migra, Shuia or Shuisk, Vodla, and Vytegra, and discharges itself into Lake Ladoga by the Svir. A canal between the Vytegra and the Kayla, an affluent of Lake Bielo, gives it an opening into the basin of the Volga. (2) A river to the east of Lake Onega, which, issuing from Lake Lacha, government of Olonetz, flows first northeast, then northwest, and after a course of about 270 miles, so much broken by falls and rapids that it cannot be considered as navigable, falls into the White Sea at the southeast extremity of the Gulf of Onega.

**Oneida,** ò-nī'dā, N. Y., city in Madison County; on the New York C. & H. R., the West Shore, and the New York, O. & W. R.R.'s; about 110 miles in direct line west by north of

Albany, the State capital. The place was settled in 1839, at the opening of the Utica & Syracuse Railroad, now the New York Central & Hudson River Railroad, and was incorporated as a village 20 June 1848. It was granted a city charter 28 March 1901. It is the commercial centre of a fertile agricultural region, and has considerable manufacturing interests. The chief manufacturing establishments are chair factories, push cart works, casket and carriage factories, knitting mills, steel pulley works, cigar factories, canneries, iron works, and sash and blind factories. There are about 1,800 employees in the manufactories. It has a large trade in its own manufactures and in farm and dairy products and fruit. It has a city hospital, an Old Ladies' Home, an excellent high school, and eight churches.

**Oneida Lake** (q.v.), five miles north by west, is a popular outing place. The Oneida Community (q.v.) is located two miles to the south, and Oneida Castle, the site of the ancient headquarters of the Oneida Indians, is about four miles south. The four banks have a combined capital of \$235,000, and the annual amount of the business is about \$30,000,000. The government is vested in a mayor and six aldermen. The city owns and operates the waterworks. Pop. (1900) 6,364; (1910) 8,317. Consult Durant, 'History of Oneida County.'

S. A. NIXON,  
Editor 'Oneida Union.'

**Oneida,** a lake in New York, on the boundaries of Oneida, Oswego, Madison, and Onondaga counties; about 18 miles south of the eastern part of Lake Ontario. It is 20 miles long and about 5½ miles wide. Several small streams flow into the lake; the head-waters of those from Oneida County are near the source of the Mohawk River. The outlet of the lake is Oneida River, whose waters enter Lake Ontario through Oswego River. Sylvan Beach, on the east shore, is a favorite resort. A number of small villages are along the shore, and the lake has a few islands.

**Oneida Community,** a settlement of Communists (see **COMMUNISM**) at Oneida, Madison County, N. Y., sometimes called Perfectionists. The community was founded in 1847 by John Humphrey Noyes (q.v.). He had originally formed a small settlement of his fellowmen at Putney, Vt., in 1838. During the first 10 years the settlement at Oneida made slow progress, but eventually became very successful, as a result of numerous industries and manufactures. The community followed a complex marriage system, there being no ceremony nor permanent ties between couples, and the community assumed all responsibility in the support and education of children. Outside opposition, principally from the Protestant churches, arose, and the marriage system was abolished in 1879. The community then reorganized and a joint stock company was organized in 1881. The co-operative plan was followed in financial and domestic matters. In 1882 the community had property valued at \$600,000. Since the reorganization branch manufactories have been established at Niagara Falls, Sherrill, and Kenwood, N. Y., and in 1903 the total valuation of community property was said to exceed \$2,000,000. There are upward of 300 persons in the community.



## ONEIDA INDIANS — ONIONS

Consult Hinds, 'American Communities' (1902).

**Oneida Indians**, an American tribe of the Iroquois confederacy formerly living on the shores of Oneida Lake, N. Y. They were friendly to the French and the Jesuits, but they took sides with the Americans in the Revolutionary War. Subsequently they were attacked by the hostile Iroquois under Brant, who burned their villages and forced them to take refuge in the American settlements. A considerable number of them settled on the Thames River, Ontario, Canada, where about 800 survivors lived in 1903. Others reside in Wisconsin, New York, and on the Grand River, Canada. There are about 3,000 of them now living. See also SIX NATIONS.

**O'Neil, ò-nēl', Charles**, American rear-admiral: b. England 1842. He entered the United States navy as master's mate in 1861; was on the Cumberland at the capture of Forts Hatteras and Clarke in August 1861, and served in the engagement with the Confederate iron-clad Merrimac, 8 March 1862, and during two attacks on Fort Fisher. He became captain in July 1897; was chief of the naval bureau of ordnance 1897-1904; became rear-admiral 22 April 1901; and was retired 15 March 1904.

**O'Neill, Eliza**, LADY BECHER, Irish actress: b. Ireland 1791; d. there 29 Oct. 1872. She made her first appearance at 12 as the Duke of York in her father's company, and her formal début at Covent Garden in 1814 as Juliet. She was an emotional actress and suited for tragedy roles, in which she played for five years as England's most popular actress. She retired from the stage on her marriage to William Becher, M.P., who later became a baronet.

**O'Neill, Owen Roe** ("RED OWEN"), Irish warrior, d. 6 Nov. 1649. He commanded the Irish forces in the wars against the English in the first half of the 17th century. On 5 June 1646, with 5,000 men he routed Monroe's army of 7,000, killing one half of the enemy.

**Oneonta, ò-ne-ôn'ta**, N. Y., village in Otsego County; on the Susquehanna River, and on the Delaware & H., the Ulster & D., and the Oneonta, C. & R. S. R.R.'s; about 70 miles southwest of Albany. The town of Oneonta was settled prior to the Revolution, but the first settlement within what is now the village limits was made in 1790 by Frederick Brown. It was incorporated as a village in 1848. It is in an agricultural region and has several important industries connected with farm products. The chief manufacturing establishments are Delaware & Hudson shops, which have 750 employees; the cigar factories, 100 employees; knitting-mill, 150 employees; flour-mill, 100; shirt factory, 100; silk-mill, 100. It is the seat of the Oneonta State Normal and Training School, which had enrolled in 1904 nearly 1,000 pupils. It has the Aurelia Fox Memorial Hospital, a State armory, a public library, and 10 churches. The government is vested in a president and a board of six trustees, two of whom are elected each year. Pop. (1900) 7,147; (1910) 9,491.

F. M. H. JACKSON,  
Business Manager 'The Star.'

**Onias**, a Jewish high priest, the son of Simon. About 188 B.C. he fled to Egypt, where

he built the temple of Leontopolis, or rather he remodeled an old pagan temple given to him by the Egyptians. This Leontopolis was located near Heliopolis, 180 stadia from Memphis, and must not be confounded with the Leontopolis of the Delta. There is more or less obscurity regarding Onias, and from various accounts there appears to have been three of this name. Josephus declares that the builder of the Leontopolis was a son of Onias who fled to Egypt in the time of Antiochus V., about 164 B.C. Another account says that Onias III. was murdered by Andronicus in a sanctuary near Antioch. In Isaiah (xix. 18-25) reference is made to five cities in Egypt, occupied by Hebrews, one of them called Leonopolis (the city of the Lion); and also to an altar and sacred tower at the border of Egypt where the Egyptians are expected to offer sacrifices to Yahweh.

**Onion**, a river in Vermont. See WINOOSKI.

**Onions**, and **Onion Culture**, various species of *Allium*, a genus of the lily family; specifically, *A. cepa*, a bulbous-rooted biennial herb with hollow radical leaves and a leafless, hollow, usually swelling stem, which bears an umbel of small six-segmented bell-shaped white or pinkish flowers, replaced in some cases by bulblets. It has been so long in cultivation that its original form is not definitely known. Probably it is a native of western Asia and adjacent parts of Africa, since it is mentioned in old Egyptian writings, the Pentateuch, etc. It has spread to all countries occupied by civilized man, by whom its bulbs (and to some extent its leaves) are used as a vegetable and for flavoring various culinary preparations.

Being very hardy, the onion may be planted as soon as the ground can be worked in early spring, or it may be cultivated during the winter where the temperature does not fall to the freezing point. In the Southern States it is generally cultivated as a winter crop. The essentials of its cultivation are a well-drained, light, friable soil, rich in all plant food and humus, and, above all else, free from weeds. Onions, especially while little, cannot compete with weeds. Reclaimed marshes, such as are used for celery, are highly valued also as onion fields. Every effort having been made to make the soil as loose as possible, the seed is sown in drills about 12 inches apart, machines being used for the purpose. Since the plants are somewhat slow in making their appearance, and are very inconspicuous, planters often mix a few radish or turnip seeds with the onion seed, the young radishes being quick to appear, conspicuous, easy to remove, and serving to indicate the positions of the rows until the onion plants can be seen. Throughout the growing season the onions are kept free from weeds, thinned to distances about three inches apart, and the soil between the rows is kept loose and open by frequent cultivation. When the necks of most of the bulbs have turned yellow in the autumn the bulbs are pulled, four or five rows being combined in one windrow, and the "scullions," or thick-necked, immature bulbs, discarded. After drying in the field for a few days the bulbs are gathered in crates, which are piled under cover for further drying before sorting and shipping them to market. Dryness, coolness. (Just above freez-

ing), and soundness are essentials in storing onions during the winter.

Onion cultivation has several modifications of importance. Improved methods of culture consist in starting the plants in hotbeds or cold-frames, and transplanting them to the field when four or six inches tall, and thereafter cultivating them as above described. The advantages claimed for this method are that the plantlets are under complete control while small—the precarious time; that they are readily transplanted under ordinary conditions; that the cost of transplanting is not greatly in excess of that of weeding in the other method; and that not only is there a more even stand in the field, but that the bulbs are larger and of more uniform grade. Another frequent practice is the sowing of seed in the autumn where the plants are to remain; and a still more common one is the planting of "sets,"—little onions which have been specially grown for this purpose, the seed being sown very thickly the year previous. These sets are especially valued for the production of "bunch onions," which appear in the markets during the early spring and summer months.

Some varieties of the onion are remarkable for their method of propagation. The potato or multiplier onion has two or more "cores" or "hearts," each of which will send up leaves when the bulb is planted. If separated from its fellow hearts, each core will produce a new compound bulb and sometimes send up a flower-stalk. This variety is therefore a perennial which resembles garlic in its method of propagation, and is intermediate in flavor between garlic and the common onion. Another botanical variety is the "top" or "tree" onion, which develops bulblets instead of flowers, or both, at the top of the flower-stems.

Of the varieties of the common onion grown in America, the red ones are usually of strongest flavor, the yellow ones next, and the white ones mildest. But still milder and better flavored are the foreign varieties known as Bermuda, Spanish, etc., which are less hardy than the common kinds and are little grown in the North. They are largely cultivated in the South and in California, whence the markets derive their chief supply.

The Welsh onion or "cibol" (*Allium fistulosum*) is a native of Siberia. It resembles the leek in the absence of a distinct bulb, but differs from the leek in its hollow, onion-like leaves, which are cut like those of the shallot and used for flavoring. It is of dwarfer growth than the common onion and has more clustered leaves. It may be propagated by division of the bulbs or by seeds. In the United States it has not become very popular.

Onions are occasionally seriously attacked by so-called parasitic plants, which may devastate whole fields and which are not of easy control by any devised method. Bordeaux mixture has been recommended, but rotation, the crop being planted upon smut-free land, is perhaps most satisfactory.

Among the insects which prove destructive to the onion are several species of cut-worms, all of which may be held in check by poisoned baits, such as sweetened bran or clover, or by trapping in early spring when the insects revive after passing the winter in the larval stage.

The onion thrips (*Thrips iridii*), a tiny sucking insect, sometimes devastates whole fields by appearing in great numbers, puncturing the leaves, which turn yellow wherever pierced. It is especially troublesome in Bermuda. Kerosene emulsion has been most frequently recommended as a remedy. The most serious pest, however, is perhaps the onion maggot, the larva of a fly (*Agrehis messoria*) which lays its eggs close to the young onions in early spring. The larvæ burrow into the young bulb, causing the plant to wilt and decay, a result which follows even slight injury. In late spring the maggots pupate and in about two weeks appear as adults, which lay eggs for a second brood. This brood winters partly as adults and partly as pupæ. The best remedy is probably ground tobacco-stems liberally applied to the young plants in early spring. This acts as a repellent, an insecticide, and as a fertilizer, and may be applied without fear of its injuring the plants. Another good plan is to pull and burn the plants of the early sowing when found to be wilting, which will lessen the number of flies able to lay eggs for the second brood. Nitrate of soda and kainit are recommended to be sown broadcast after the removal of the wilted plants; these are thought to act as insecticides and fertilizers.

Consult Bailey, 'Cyclopedia of American Horticulture' (1900-2) and the special literature therein mentioned under the article *Onion*.

M. G. KALKS,  
Horticulturalist.

Onkelos (Aramaic for the Greek name Akylas), author of the Targum or Chaldean paraphrase of the Pentateuch which bears his name. According to the Babylonian Talmud he lived in the time of Gamaliel, but is not earlier than the 2d and not later than the 3d century. His Chaldee is purer than that used in Palestine, and he may have been a Babylonian. His version is good, and continued until the beginning of the 16th century to be chanted in the synagogues alternately with the Hebrew. It has often been printed with or without the Hebrew text. See TARGUM.

Onomacritus, ὄν-ὁ-μᾶκ-ρί-τῦς, Greek soothsayer and poet, who lived in the time of the Pisistratids, 6th century B.C. At Athens he was the head of an Orphic sect and expounded the mysticism, poetry, and theology of Musæus, while his pupils arranged the Homeric poems in connected series in accordance with the suggestion of Pisistratus. Having been detected making an interpolation in one of these oracles, he was banished from Athens by Hipparchus about 516 B.C. He withdrew to Persia, where the Pisistratids employed him to encourage Xerxes to invade Greece by repeating to the king such oracles as seemed to promise success.

Onomasticon, a Greek term properly meaning a list of names or words, denotes particularly a dictionary or encyclopædia in which individual subjects or things are mentioned and explained under their own names or heads. The oldest work under this name still extant is that of Pollux, executed in the 2d century B.C., in the Greek tongue.

Onondaga, ōn-ōn-dā'ga, a lake in New York, near Syracuse. The outlet is Seneca River. Onondaga Castle, the headquarters of the Onondaga Indians (q.v.), was near this lake.

## ONONDAGA INDIANS — ONTARIO

**Onondaga Indians**, an American tribe of the Iroquois confederacy residing in central New York, on the shores of Onondaga Lake. In 1660 there were about 1,600 in the tribe, and fully 1,000 still survive. About one half of the original tribe followed Brant to Canada and settled on the Grand River, in Ontario.

**Onondaga Period**, in geology, the central division of the Upper Silurian (see **SILURIAN**), coming between the Niagara and the Lower Helderberg periods. It may be divided into two formations, which seldom occur together, namely, the Salina and the Water-Lime groups. The former reaches its maximum thickness in New York, near Syracuse, and is characterized by the great salt-mines of central New York; in western Ontario it is 1,400 feet thick, containing limestone shale and dolomite as well as salt. The Water-Lime group is a hydraulic limestone, containing valuable gypsum quarries near Syracuse, and in Cayuga and Genesee counties, and at Gypsum, Ohio, near Sandusky; hydraulic cement is produced in Ulster County, N. Y. There are few fossils in the Water-Lime group and scarcely any in the Salina formation. The rocks of the Onondaga period run south from central and eastern New York into Pennsylvania, and west through parts of Ohio, Michigan, and Wisconsin.

**Onosander**, more correctly **ONESANDER**, a writer on military tactics who lived at Rome in the middle of the 1st century after Christ, and composed in Greek, under the title of *Strategetikos*, an excellent work on the art of war.

**Onospin**, in chemistry,  $C_8H_{10}O_4$ . Produced, together with formic acid, by boiling ononin with baryta water. On passing carbonic acid gas into the solution, and digesting the precipitate in boiling water, onospin deposits on cooling, as a white, interlaced, crystalline mass, insoluble in ether, but soluble in alcohol and the alkalis. It is colored crimson-red by sulphuric acid and binoxide of manganese. Melts at  $162^\circ$ .

**Onotes**, *ō-nō'tās*, an extinct tribe of South American Indians. They inhabited the eastern shore of Lake Maracaibo, lived chiefly by fishing, and built their houses on platforms over the water, supported by piles driven into the lake bottom. Ojeda found them living thus in 1499, and from the analogy fancifully named the country Venezuela (namely, Little Venice). Similar dwellings are found in this region though the tribe as an entity, chiefly through slavery, long ago became extinct.

**Onslow, George**, French composer: b. in Clermont-Ferrand, France, 27 July 1784; d. there 3 Oct. 1853. He was a grandson of the first Lord Onslow, and after studying in London with Cramer, Dussek, and Hüllmandel he completed his musical education under Reicha in Paris. He was elected to succeed Cherubini in the French Academy in 1824. His operas were only a moderate success, but he composed many beautiful quartets, sonatas, symphonies, and other instrumental pieces that are still popular. His operas include: *'L'Acalde de la Vega'* (1824); *'Le Colporteur'* (1827); and *'Le Duc de Guise'* (1831).

**Onslow, William Hillier**, 4th Earl of Onslow: b. 7 March 1853. He was graduated at Eton and at Exeter College, Oxford, and

succeeded his grand-uncle in 1870. He was under-secretary of state for the colonies, 1887-8; parliamentary secretary to the Board of Trade, 1888; governor of New Zealand, 1888-92; under-secretary for India, 1895-1900; and under-secretary for the colonies after 1900. He was lord-in-waiting to Her Majesty, Queen Victoria, 1880, 1886-7; is high steward of Guilford; and from 1895-8 was leader of the Moderate Party in the London county council.

**Ontario**, Canada, the most populous Province of the Dominion, and was formerly called Upper Canada, or Canada West. It is bounded on the north by Keewatin, the Albany River, and James Bay, the southern extension of Hudson's Bay; on the northeast and east by the province of Quebec and the Ottawa River; on the south by the Saint Lawrence River, Lake of the Thousand Isles, Lake Ontario, Niagara River, and Lake Erie; and on the west by the Detroit River, Lake Saint Clair, Saint Clair River, Lake Huron, Lake Superior, and Manitoba. Area, 260,862 square miles, of which 40,354 square miles are water. For administrative purposes the province is divided into 44 counties, subdivided into townships and 98 electoral districts, including the three unorganized districts of Algoma, Thunder Bay, and Rainy River. The capital is Toronto (q.v.) and the province also contains the Dominion capital, Ottawa (q.v.), situated in the eastern part of the province. Other important cities and towns are Hamilton, London, Kingston, Brantford, Guelph, and Saint Catharines (qq.v.).

**Topography and Physical Features.**—The surface generally is an undulating plateau land with no considerable elevations. The Laurentian Hills, with a maximum altitude of 1,200 feet, extend westward from the Thousand Islands near Kingston to north of Lake Simcoe and constitute the watershed separating the rivers flowing into the Great Lakes from those entering Hudson's Bay, and the Ottawa and Saint Lawrence rivers. The chief rivers are those already mentioned, with the Albany, entering James Bay, and the Niagara, the celebrated falls and gorge of the latter belonging partly to the province and partly to the United States. Besides the Great Lakes numerous smaller lakes, including Nipissing, Nipigon, Simcoe, and Muskoka, belong to the province.

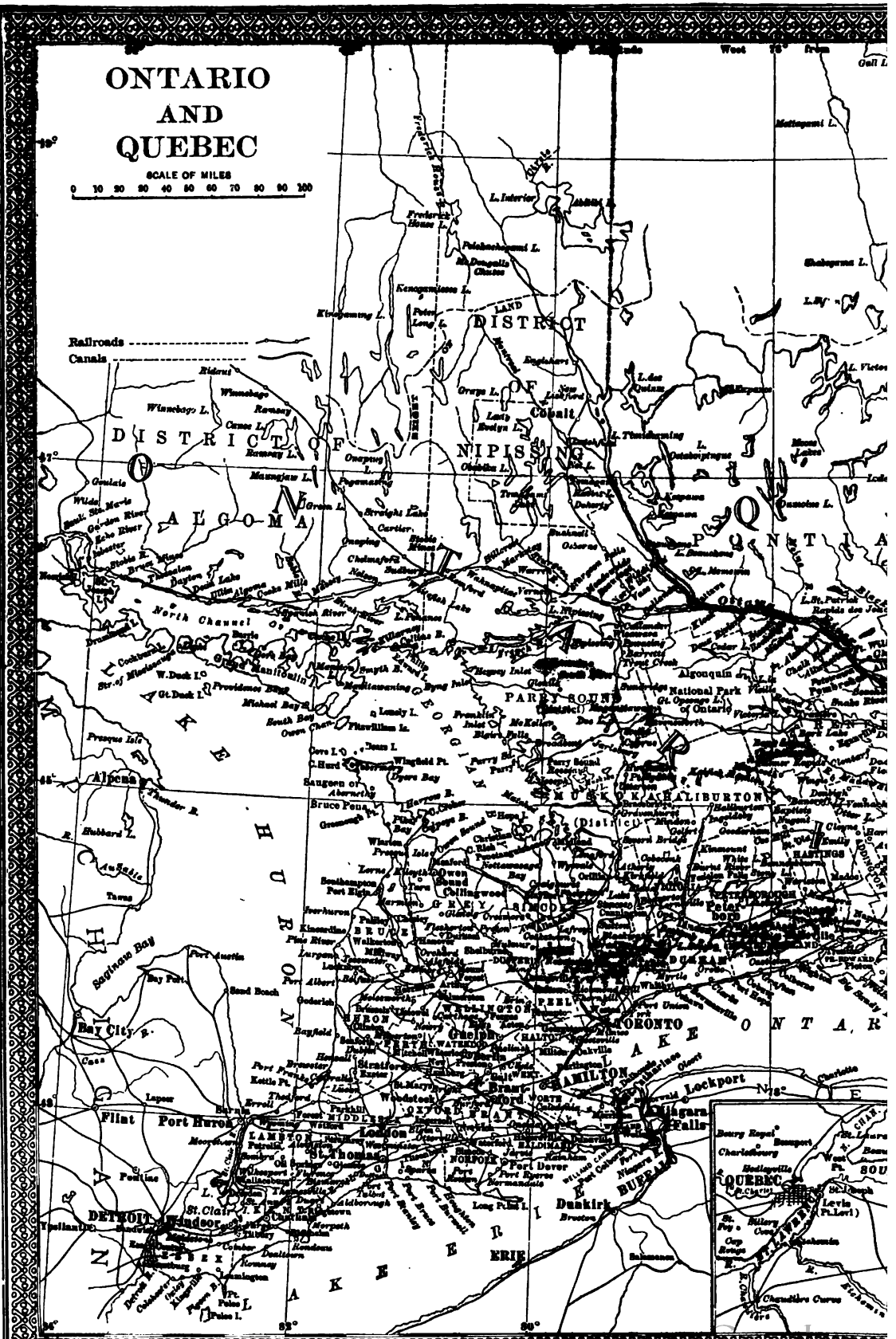
**Natural Resources.**—About one half of the province is covered with timber, chiefly pine, spruce, tamarack, oak, and hickory, with water facilities making lumbering one of the principal industries.

Fur-bearing animals, the mink, otter, skunk, are obtained in considerable quantities in northern Ontario, which is also a popular hunting ground for moose, caribou, and other large game. Fisheries are important, the catch consisting of trout, white-fish, herring, pickerel, etc., in 1910 being valued at \$2,026,121. The province is rich in minerals, which are found chiefly in the Huronian Rocks, which, with the Laurentian series, both of Archæan crystalline formation, constitute the principal geological characteristics of the region. The minerals include iron, copper, lead, plumbago, apatite, arsenic, and antimony, while gypsum, marble, and building stone are abundant; gold and silver

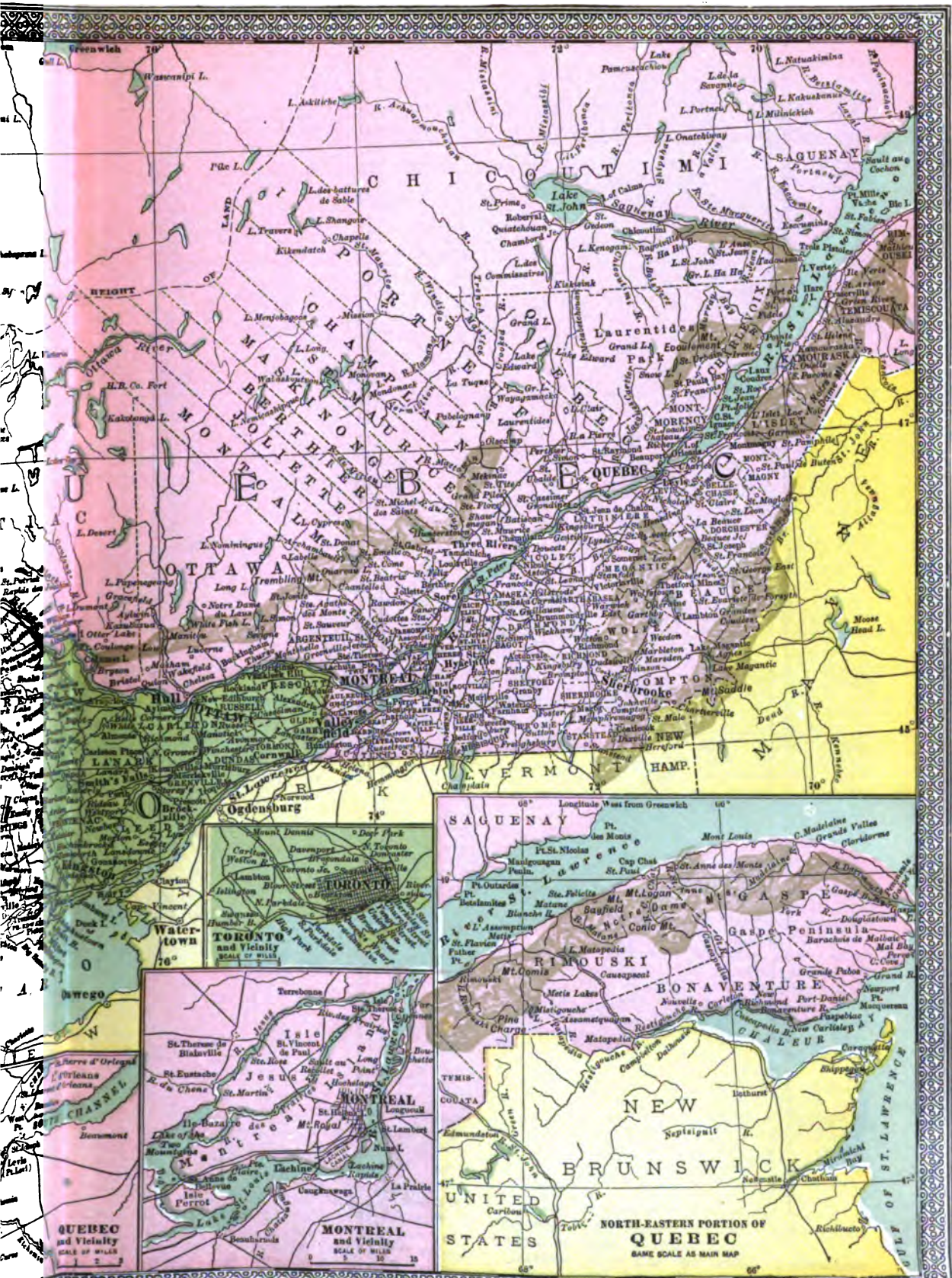


# ONTARIO AND QUEBEC

SCALE OF MILES  
0 10 20 30 40 50 60 70 80 90 100











## ONTARIO

deposits exist; the latter being very extensive in the country along the shores of Lake Superior and westward to the Lake of the Woods. In 1883 nickel was discovered at Sudbury, the deposit since proving to be the richest in the world. The province is rich in petroleum, the wells in the southwest, especially in Lambton County, yielding immense and apparently inexhaustible supplies, over 30,000,000 gallons annually, while the same may be said of the salt wells on the shores of Lake Huron. Natural gas fields in the east near Niagara and in the west near Detroit, supplying Buffalo and Detroit respectively, have been exploited to the value of about \$300,000 annually. Ontario's mining production in 1910 was \$39,313,895, of which metallic production was \$28,161,678 (gold, \$68,489; silver, \$15,481,332; cobalt, \$54,669; nickel, \$4,005,961; copper, \$1,374,103; iron ore, \$513,721; pig iron, \$6,975,418; zinc ore, \$5,760; less \$317,804 worth of iron ore smelted into pig iron). Non-metallic production was \$11,152,217. Cobalt has over 40 producing mines with a production valued at \$50,000,000. Ontario is in third place among silver-producing lands.

*Climate.*—The climate is inclined to the extremes of heat and cold during summer and winter respectively, but owing to the dryness of the atmosphere it is always healthful and bracing. Extreme cold is felt only in the northern part, the vicinity of the Great Lakes in the south greatly modifying the extremes of temperature. The average temperature for January in the south is 21°, minimum 10°, below zero; the average for July is 68°, maximum 90°, but rare, the ordinary maximum being 80°.

*Agriculture.*—Farming is an important occupation, especially in the south, where soils of black loam, with clay and sandy varieties, are of excellent quality, and highly productive. The richest, most thickly settled, and most highly cultivated portion of the province is the peninsula between the Ottawa River and Lakes Ontario, Erie, and Huron. Until within a few years Northern Ontario, or "New Ontario" as it is sometimes called, comprising the unorganized districts of Nipissing, Algoma, Thunder Bay, and Rainy River, was considered unsuited for farming and left to the lumberman, the trapper, and later to the seekers after its great mineral wealth. However, it has been demonstrated that in addition to its forests and its mines, this great section, embracing 141,000 square miles, possesses thousands of acres of farm land as fertile as any in the Province. The "Great Clay Belt," extending from Lake Temiskaming in the East almost across the Province, is estimated to contain 15,680,000 acres of tillable land, it is well-watered, and the wood of the timbered section is of large commercial value. Railways are planned or building to open up this section, and settlers are pouring into it. Other fertile sections are the Rainy River Valley in the west, with 750,000 acres, an important area at the head of Lake Temiskaming, with more than a million acres, and the valley of the Wabigoon River, with 384,000 acres. The crops raised are chiefly wheat, barley, oats, Indian corn, potatoes, and some tobacco, and the fruit-growing farms of some districts yield a plentiful crop of apples, plums, pears, peaches, and grapes. In 1911 there were 2,295,534 bushels of spring wheat raised and 17,926,856 of fall wheat;

16,248,129 bushels of barley, 84,829,232 bushels of oats, 21,913,290 bushels of Indian corn, and 13,918,698 bushels of potatoes. The total value of field crops was \$99,467,000. Stock raising, dairy farming, and bee culture are among comparatively recent industries of the province which have been attended with encouraging results, largely due to the easy accessibility of markets by rail, supplemented by the lake, river, and canal navigation. Ontario has 6,029,300 live stock: horses, 791,000; milch cows, 1,234,500; other cattle, 1,558,600; sheep, 975,400; swine, 1,469,800. Average value of occupied farm land (1910) was \$48 per acre, and the farmers of the province have \$1,200,000,000 invested. Ontario has 400,000 acres of fruit lands producing \$15,000,000 annually in profits.

The problems affecting agricultural life in Ontario as elsewhere are not few. The loneliness of farm life, the scarcity of labor, the decreasing population of rural districts owing to the lure of the West, are obvious problems, although they do not seem to impoverish the individual farmer or prevent increased production and rising profits. In the 10 years (1900 to 1909) the rural population fell from 1,108,874 to 1,047,016, while the town and village population increased from 901,874 to 1,197,274. In New Ontario the problems were forest fires, inevitable transportation needs, the pioneer difficulties of clearing the land, etc. But these are trivial considerations in the general growth of the Province, and they are met by the encouragement of immigration and the sympathetic treatment by the Government of questions as they developed.

*Manufactures and Commerce.*—The manufactures are numerous and abundant, chiefly owing to the favorable position which the province occupies with regard to water-power, although steam-power has been introduced to a large extent, coal being obtained without difficulty by means of the lakes, from Pennsylvania, and in smaller quantities from Nova Scotia. Chief among the supplies of water-power are the falls on the Ottawa River and the Rapids of the Lawrence, while the works on the Ontario side of the Niagara Falls will give the province the most extensive water-power works in the world. The principal manufactures are lumber and its by-products, agricultural implements, iron and woodware, wagons and carriages, railway rolling-stock (including locomotives), cottons and woollens, leather, furniture, flax, ordinary iron and hardware, paper, soap, etc. The annual value of the exports in 1902 of manufactured goods, agricultural products, animals and their products, timber, minerals, etc., is over \$50,000,000. The imports, of which the chief is coal, amount approximately to \$90,000,000. The United States and Great Britain share the bulk of the external trade.

*Railways, Canals, and Shipping.*—Ontario has a perfect network of railways, nearly 7,000 miles, which has proved of great advantage in the development of the manufacturing and agricultural industries. In summer it is supplemented by the means of transport provided by the lakes and by a magnificent system of canals. The principal canals are the Sault Ste. Marie Canal, and the Welland Canal, the latter 27 miles long, east of and parallel to the Niagara River, connecting Lakes Erie and Ontario.

*Government.*—The provincial government is administered by a lieutenant-governor ap-

## ONTARIO AGRICULTURAL COLLEGE

pointed by the governor-general-in-council for five years, assisted by a responsible ministry. There is only one chamber, the Legislative Assembly, elected by ballot for four years, with 98 members, by the apportionment of 1901. By the redistribution of 1903 the province has 24 senators and 86 representatives in the Dominion Parliament. The Government's policy is to encourage the development of provincial resources, and this may be said to be also the Opposition party's policy. The revenue of Ontario is made up of subsidies and contributions from the Dominion treasury and from parol land and lumber sales, licenses, stamps, etc. The expenditure is invariably under the revenue, and the finances of the province are in a thoroughly satisfactory condition. The total annual government receipts are about \$9,000,000 and the total expenditures about the same. The municipal system is one of the most perfect in the world, and affords a pattern followed in many other countries.

**Population.**—The total population in 1911 was 2,523,294, as compared with 2,182,947 in 1901, showing an increase of 12 per cent. The majority of the population is of English descent, Scotch, however, predominating in Bruce, Grey, and Glengary counties; Irish, German, and other nationalities are found around Toronto. There are about 21,000 Indians.

**Education.**—The school system of Ontario is admirable, and is under the control of a minister of education, who is always a member of the Provincial Cabinet. The schools are supported by a tax on property, with state grants, and are free to all. They include kindergartens, public schools, and high schools or collegiate institutions. Roman Catholics may, and do, establish separate schools, and are then exempted from supporting the public schools, and receive a separate grant from the government. There are schools for Indian children, normal schools, normal colleges, country model schools, art schools, and 131 free libraries under the care of the board of education. The travelling libraries numbered 168. Ontario has 6,551 elementary and secondary schools, employing 8,586 teachers, and having an enrollment of 508,563 pupils. There are in addition 146 high schools and 128 continuation schools. Ontario has 467 Roman Catholic and 6 Protestant separate public schools. For public and separate schools the province now spends about \$9,000,000 annually. At the head of the educational system stands Toronto University (q.v.), aided by provincial funds. Other universities include Queen's University (q.v.) at Kingston, and Victoria, Trinity, McMaster, etc., affiliated with Toronto University.

**Religion.**—There is no state religion. The Methodist, Presbyterian, Roman Catholic, Church of England, and Baptist are the strongest numerically of the religious denominations.

**History.**—Ontario as part of Quebec was hunted over by the French after its exploration by Champlain in 1615 and visited by Jesuit missionaries to the Indians. The French occupation was not a source of much settlement but was marked by wars with the Iroquois Indians or Five Nations, in which the Huron allies of the French were almost totally annihilated. In 1763, with Quebec and the Atlantic provinces, Ontario passed into the hands of Great Britain, which organized the province of Quebec in 1774

and in 1791 divided it into Upper and Lower Canada. At the close of the American Revolution in 1783, Ontario received a notable immigration of United Empire Loyalists from the United States who were the actual founders of the province. Upper and Lower Canada were reunited in 1841, and again separated when the Dominion of Canada was organized in 1867, the western province becoming the province of Ontario. Besides these, the chief incidents of its history were several battles and invasions of the War of 1812, notably those of the Thames, Lundy's Lane, and Queenston Heights; the evolution of full responsible government and British institutions; the unsuccessful uprising of 1837 directed against certain local causes of complaint and rule and not against Great Britain; the Fenian Raids of 1866 from the United States; the great prosperity of the Crimean war and reciprocity period of 1854-66; the industrial and agricultural growth of 1880-1912.

Consult: Hopkins, 'Canada: an Encyclopedia of the Country,' and 'The Statistical Year-Book of Canada and Geological Survey of Ontario.'

Revised by J. CASTELL HOPKINS.

**Ontario Agricultural College, The.** This institution, located at Guelph, Canada, was founded in the year 1874, with a staff of six officers, and it was opened in the same year with an attendance of 28 students. For four years the school struggled on, first under one principal and then under another, until in 1879 Dr. James Mills was appointed to the presidency and a period of ever-increasing popularity and usefulness for the institution set in. From that time to the present, 1904, the college grew steadily in equipment, attendance, and popularity, and it now embraces a plant worth nearly a million dollars, with well-equipped departments of animal and field husbandry, veterinary science, horticulture, dairying, domestic science, and nature study, a full set of large and substantial farm buildings, a farm of 550 acres, residences for both male and female students, and first-class laboratories for chemistry, physics, biology, and bacteriology, provided with apparatus for student instruction and for scientific research work, and an efficient staff of 35 instructors and officers. In February, 1904, Dr. James Mills, who for 25 years had directed the affairs of the Institution, resigned his position and was succeeded by G. C. Creelman, B.S.A., M.S., the present head of the College. The institution provides the following courses:

**Agriculture.**—A two years' course leading to a diploma entitling the holder to the Status of Associate of the College and designed especially to train men for the farm. A four years' course leading to the Degree of Bachelor of the Science of Agriculture and designed to train men more completely in the sciences underlying practical agriculture and to fit them for professional agricultural pursuits. Various short courses in Dairying, Stock and Seed Judging, Poultry Raising, etc., and lasting for periods varying from two weeks to three months.

**Domestic Science Courses** including professional courses for teachers and non-professional housekeepers' courses.

**Nature Study Courses** for the training of teachers in rural schools.

G. C. CREELMAN,  
President of the College.

**Ontario, Lake, North America**, the smallest and easternmost of the five Great Lakes in the Saint Lawrence basin, forming a portion of the boundary between and partly belonging to the United States, and partly to the Dominion of Canada. It is of elongated, oval shape, 185 miles long, with a maximum central breadth of 60 miles, a circumference of about 480 miles, and an area of 7,400 square miles. Its surface level is about 334 feet below that of Lake Erie (see article **NIAGARA FRONTIER**), and 231 feet above the tide level of the Saint Lawrence. Its depth is said to average 490 feet; but in some places it is upward of 600 feet in depth, and it is navigable throughout its whole extent for vessels of the largest size. It receives the waters of Lake Erie through the Niagara River (q.v.) with its phenomenal falls and gorge on the southwest, and discharges at its northeast extremity through the Lake of a Thousand Isles, by the Saint Lawrence (q.v.). It also receives numerous rivers, including the Trent and Humber on its north, and the Black, Genesee, and Oswego from its southern shores. Lake Ontario has many good harbors; and as it never freezes, except at the sides, where the water is shallow, its navigation is not interrupted like that of Lake Erie. It is, however, subject to violent storms and heavy swells. It communicates by the Genesee River and Oswego Canal with the Erie Canal, and, consequently, with the Hudson River and New York city; the Niagara River and the Welland Canal, at its southwest extremity, unite it with Lake Erie, and the Rideau Canal connects it with the Ottawa at Ottawa city. Toronto, Kingston, Newcastle, and Niagara are the principal towns on the British side; and Oswego, Genesee, and Sacket Harbor on the American bank.

**Ontog'eny**, in biology, the individual development of an organized being, as distinguished from phylogeny. These terms were first introduced as divisions of "biogenesis."

**Ontology** (Greek *ὄντος*, being, and *λόγος*, account, science), the science of being, that is, metaphysics. Aristotle did not employ the word, but called this branch of science the "First Philosophy," defining it as the science of being, of that which exists, as far as it may be said to exist (*ἐπιστήμη τοῦ ὄντος ἢ ὅτιος*), that is, the science of the essence of things; of things, not with regard to their accidents, qualities, physical or mathematical, but merely as being; the word being including not only whatever actually is, but whatever can be.

The word ontology was first introduced into philosophy by Christian Freiherr von Wolff (q.v.). He divided metaphysics into four parts: ontology, psychology, rational cosmology, and theology. Kant denied that one can have any knowledge of existences, but only of appearances or phenomena. He believed that there was a rational science of principles and causes of the principles of being and knowing, and his system of metaphysics was merely an exposition of this rational ontology. Rational ontology may be treated in two different ways according as we postulate one existence or many. If there is one existence, there must be one cause, and all phenomena are but modifications of this one existence, and effects of this one cause. This reduces metaphysics to a rational theology, the one

substance or existence, and the one cause, being the Deity, the Absolute. If many existences or causes be postulated, three co-ordinate branches of inquiry are at once opened up, namely, rational cosmology, rational psychology and rational theology. These are all *a priori* investigations, and deal with essence, not phenomena; and with God as cognizable by reason in his essential nature, as distinguished from the indications and evidences given by his works. (See **NATURAL THEOLOGY**.) Kant's 'Kritik' is the best exposition of this view. The ontological argument for the existence of God was employed by Saint Augustine, and Boethius. It was, however, most fully developed by Anselm (q.v.) in the 11th century. Consult, Anselm, 'Proslogion'; McCosh, 'Intuition of God'; Baur, 'Dogmengeschichte.' See **METAPHYSICS**, **TELEOLOGY**.

**On'yx** (Greek, "finger-nail," "veined gem"), a hard variety of agate, and hence a sub-variety of chalcedonic quartz, with layers, usually curvilinear, of white, alternating with red (sardonyx), gray (chalcedony), black (onikolo), or green or brown. Mexican onyx is actually an aragonite and is softer than the real onyx. The true ancient onyx was much praised as a gem and particularly in making cameos. Most modern onyx, so-called, is artificially colored; Algerian onyx, for instance, being only a variety of calcite. Apart from its use in jewelry, onyx has long been used in architecture, for table-tops, columns, and, in part or entire, stair-cases, being often used with white marble. Many onyx pillars quarried in Roman times are now used in Arab mosques; and in more distinctly Occidental buildings it is sometimes used, as in the stairway of the Opéra at Paris.

**Oolakan**, oo'la-kan, or **Oulachon**. See **CANDLE-FISH**.

**O'olite** (Greek, "egg-stone," so called from its resemblance in size and shape to the roe of a fish), in geology a limestone characterized by the presence of minute concretionary grains or spherules, usually formed about a bit of sand or the body of a minute foraminifer; the term may also be applied to one of these tiny spheres. What may be called the Oolitic Period was marked by frequent precipitations of muddy sediment (calcareous or ferruginous) which killed and enclosed many minute organisms. This period is the later part of the Jurassic; and in England oolite limestones are so frequent and so typical of the Upper Jurassic that the Jurassic is often divided by English geologists into the Liassic Group and the Oolitic Group, and the latter subdivided into the Lower or Bath Oolite, the Middle or Oxford Oolite, and the Upper or Portland Oolite. Oolite is still in process of formation on the Florida banks.

**Oology**. The collecting of birds' eggs has always possessed a peculiar fascination for some men, and in the attempt to claim for their pursuit a legitimate place in scientific work they have coined for it the term Oology. A famous naturalist once said that when the oologist prepared his specimens he blew all the science out through the hole in the shell, and there is much truth in the statement. The benefit that ornithology gains from the study of a cabinet full

of empty egg-shells is so slight that it is not worth the sacrifice of bird-life that the collecting entails. While the relationship between certain groups of birds is indicated in the character of their eggs, as, for instance, between the shore-birds and the gulls and terns, nevertheless the variability, in size, shape, and color is so great, within many groups, that it is impossible to form any systematic arrangement from a study of eggs alone, and it is only now and then in connection with other characters that they prove of assistance in defining a natural arrangement of birds. The significance of their shape, colors, etc., is discussed under Egg.

In collecting eggs for scientific purposes the greatest care should be exercised in positively identifying the bird to which they belong, without which data they are absolutely worthless. The nest, which is quite as important as the eggs, should also be preserved with great care, keeping it *in situ*, if possible, and all details of its location, the date of the collecting, etc., should be recorded. The method of preparing egg-shells for the cabinet is explained in many books, and many instruments have been devised for the purpose. Suffice it to say that a round hole should be drilled with an egg-drill on one side of the egg, the size depending upon the degree of advance in incubation, and the contents should be removed by the use of a fine-pointed blow-pipe. Jets of water may be used effectively to aid in emptying the shell, and should be used in washing it out, while various chemical solvents may be of assistance in dissolving well-formed embryos. Every egg-shell should bear a number corresponding to its record. Directions for the collection, preservation and care of birds' eggs are published by the Smithsonian Institution.

Probably the finest illustrated work on the oology of any region is Bendire, 'Life Histories of the Birds of North America' (1892; unfinished). Other works are: Lefevre, 'Atlas des Oeufs des Oiseaux d'Europe' (1845); Hewitson, 'Eggs of British Birds' (1856); Bädker, 'Die Eier der Europäischen Vögel' (1863); 'Des Murs Traité général d'Oologie Ornithologique' (1860).

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**O'rial, Urial, or Sha**, a large wild sheep (*ovis vignei*) inhabiting the high Himalayas and Tibetan plateaus and eastward to Persia, the chase of which calls for the greatest endurance, skill and resolution on the part of the hunters. The rams have immense, rounded, coiling horns; and while both sexes vary much in color, they agree in the habit of wandering widely.

**Ootacamund**, oo-tā-kā-münd', India. See UTAKAMAND.

**Ooze**, fine sticky mud, almost entirely of organic origin, covering great parts of the sea-floor, and constituting one of the most important of the Oceanic Deposits (q.v.). The various oozes are made up mostly of the remains of various foraminifers, and hence furnish a valuable means for the study of deep-sea micro-organisms, even apart from their role in the building up and strewing over of ocean beds. According as one variety or another of organic remains predominates or occurs characteristically, the oozes are usually classified as Globi-

gerina ooze, Pteropod ooze, Diatom ooze and Radiolarian ooze. But it must be borne in mind that no one ooze consists entirely of any one sort of the foraminifers mentioned. The division mentioned is, moreover, logically a secondary division, since we may speak of the calcareous oozes (including the Globigerina and the Pteropod) and the silicious (including the Radiolarian and Diatom oozes), a more suggestive classification, though still one that is based only on predominant characteristics, since the Globigerina ooze, for example, is never free from silicious organisms. Murray says that the silicious element even here varies from "traces" to 20 per cent. But the Globigerina ooze usually averages 40 per cent of carbonate of lime, sometimes reaching 95 per cent, and its most characteristic component is the foraminifer *Globigerina*, besides which it contains other pelagic *Foraminifera*, as *Pulvinulina*, *Orbulina*, etc. The predominant color is pale gray, with occasional red and brown tints due to the peroxides of iron or manganese. The Globigerina ooze occurs near the equator both in the Atlantic and Pacific and in the western and southern Pacific; a special variety of it marked by the presence of comparatively fewer rhizopods and more pteropods and heteropods, though these latter shells never predominate, is found in tropic depths of less than 2,000 fathoms, near the Fiji Islands and elsewhere in the Western Pacific, and is called Pteropod ooze. *Radiolaria* occur both in the Globigerina ooze and in the Diatom ooze, but where they predominate the ooze is named from them; a great strip of this silicious mud spreads between 15° N. and 10° S. to 140° E. and 150° W. in the Pacific. The color is reddish and brownish because of the presence of manganese and iron; the composition otherwise is mainly silicious, though as much as 20 per cent of carbonate of lime may occur. The other silicious variety is marked by the presence and predominance of Diatoms, with occasionally 25 per cent of Globigerina shells and other calcareous matter. Its color is that of pale straw, and, when dried, dirty white. These various classes merge into each other on the ocean bottom, and there is no hard and fast line between them. Their deposit has been slow and continuous and apparently not such as to effect continental areas, or even, markedly sea depths. See OCEAN DEPOSITS. Consult Murray, 'Challenger Reports — Deep Sea Deposits' (1891). See GLOBIGERINA.

**Opacite**, in mineralogy, black opaque grains or scales, usually of minute size, found most commonly with magnetite. They are incapable of microscopic identification and seem to vary in composition, some being graphitic, and others metallic oxides or silicates.

**O'pah, King-fish, or Sun-fish**, a large and beautiful sea-fish (*Lampris luna*) of the dory family, a native of the Eastern seas, but found in the Atlantic and Arctic oceans, and, rarely, on the North American coasts. It is about 4½ feet long and weighs 140 to 150 pounds. Its colors are very rich, the upper part of the back and sides being green, reflecting both purple and gold, and passing into yellowish-green below, the fins bright vermillion. The body is oval and laterally compressed, and the scales are small. It has a single dorsal fin and a forked tail. It is believed to feed on cuttlefish and similar animals. The flesh is highly esteemed.

## OPAL—OPEN DOOR

**O'pal**, hydrated amorphous silica, used as a gem-stone even in ancient times, when it was supposed to have magical virtues, as of making its possessor invisible if he carried it wrapped in a bay leaf, or of making him generally beloved so long as he trusts in its virtues. From the point of view of the mineralogist the opal is remarkable as never occurring in crystal form, and as differing from quartz only in having 3 to 13 per cent of water in its composition. Its fracture is conchoidal, and occasionally very perfect; its lustre vitreous, pearly, or sometimes resinous; its color variable, white, red, yellow, green, gray, and blue, occurring; its density 1.9 to 2.3, and its hardness 5.5, that is, less than quartz; it is perfectly soluble in hot caustic potash, another dissimilarity between it and quartz; and it is infusible by the blow-pipe. The principal varieties of the opal are: the *precious opal*, with splendid coloration due to fine fissures, varying from translucent to transparent, and occurring, especially, near Czarwenitz, Hungary, and in Australia, in conglomerate, basalt, or porphyritic quartz. Its color varies with climate and temperature, and sometimes disappears permanently, the opal then being called "dead." The stone is not cut, being too brittle, but is set *en cabochon*. The variety usually called Mexican is actually a sub-variety of the precious opal, occurs in Guatemala, the Faroe Islands, and in southern Australia, and should not be confused with the *fire opal*, which is the commonest opal of Mexican provenance, occurring there at Zunapan, and in Washington County, Ga., as well as in the Faroe Islands. It is a hyacinth red. The *girasol* is a Mexican and Central American variety with bluish tinge and red reflections. The *common opal* is widely distributed, has a great range of colors like the more valuable varieties, and differs from them in having neither reflections nor color-play; it is found at Leisnig, Saxony, at Kosemitz, Silesia, at Dubnik, Hungary, in the Faroe Islands, in Iceland, and in America at Cornwall, Pa., Idaho Springs, Colo., and Calaveras, Cal. *Semi-opal* is more opaque than common opal, with which it often occurs, as well as in company with chalcedony; it sometimes is considered to include *wood-opal*, which resembles petrified wood in its origin, but has the peculiar marking of the opal. A forest of opalized wood was discovered in Montana in 1903. Inferior varieties are *hydrophane*, which is transparent only in water; *mother-of-pearl opal*, used, especially when found with chalcedony, for cameos; *glass-opal* or *hyalite*, made up of glassy concretions; and *melinite*, a gray, tuberos or reniform mass.

**Opata** (ô'pâ-tâ) **Indians**, a tribe of American Indians living in the Mexican state of Sonora. They have long been Christianized, are a quiet and industrious people, and are devoted to agriculture. They are found chiefly in the central parts of the state, where they are domiciled in villages. This mode of life has given them a fairer complexion than that of the Indians who dwell entirely in the open air. They are the only Indians who have successfully contended with the savage Apaches. On many occasions they have aided the Mexican government in fighting other tribes. They number at the present time about 5,000.

**Opechancano**, ô-pêch-an-kâ'nô, an American Indian chief of the Powhatan confederacy

of Virginia. He died in 1648 after a very strenuous career. Under cover of being friendly to the English he united all the tidewater tribes in Virginia, and 22 March 1622 an attack was made on the colonists. Over 400 men, women and children were massacred. After a long term of peace, Opechancano again attacked the English in 1644 and 300 persons were put to death. The chief was afterward captured and was shot at Jamestown by a sentry appointed to guard him.

**Opelika**, ôp-ê-li'ka, Ala., city, county-seat of Lee County; on the Central of Georgia and Western of Alabama R.R.'s; about 60 miles in direct line west by north of Montgomery. It was settled in 1839 or 1840. It is in an agricultural region in which cotton is one of the chief products. The principal manufactures are cotton products, brick, fertilizers, flour, and lumber. It has considerable trade in its manufactures and the farm products of the surrounding region. Pop. (1890) 3,703; (1900) 4,245; (1910) 4,734.

**Opelousas**, ôp-ê-loo'sas, La., town, county-seat of Saint Landry County; on the Bayou Teche, and on the Southern Pacific railroad; 55 miles west of Baton Rouge. It is the trade centre of a cotton, rice, and live stock raising district, and contains a cotton compress and a cottonseed-oil mill. It has a high school and the Academy of the Immaculate Conception (Roman Catholic); the high school has a free library of over 1,000 volumes. Pop. (1910) 4,623.

**Open-bill**, an African bird (*Anastomus lamelligerus*) of the stork family, so named from the odd formation of the beak, which at the anterior end exhibits a gap between the mandibles; it also is furnished with lamellations forming a sifting apparatus analogous to that of the bills of ducks. Another species (*A. oscilians*) inhabits the East Indies. The beak is yellow, and the general plumage black with dashes or suggestions of green and purple throughout. The open-bills are also called shell-storks or shell-ibises on account of their ordinary food, which consists of mollusks.

**Open Door**, **The**, a term of diplomatic significance applied to the unrestricted maintenance of international commercial relations. It came into general use in the 19th century in regard to conditions in Eastern Asia, and indicates an arrangement binding by general consent rather than by treaty, whereby all nations are allowed to trade in China and its dependencies upon equal terms. The European Powers controlling spheres of influence in the Chinese Empire tacitly admit foreign traders into their spheres on the same conditions as traders of their own country. This agreement, so far as the United States and other Powers are concerned, places China, commercially, in the same relation to the rest of the world that she had before the spheres of influence were recognized. Her tariff rates are to be uniform to all nations with which she enjoys trade treaties. The Powers on their side, agree to respect existing treaties, a condition of considerable importance to the expansion of commerce in that of the United States in particular. See articles on TREATY PORTS; AMERICAN EXPORTS AND IMPORTS; FOREIGN TRADE; FREE TRADE; TRADE; TARIFF.



## OPEQUON

**Opequon, 5-pēk'an, Battle of the** (also called the Battle of Winchester). On the night of 18 Sept. 1864 Gen. Early had Ramseur's division and Nelson's artillery in position about 1½ miles east of Winchester, Va., across the Berryville road, along an elevated plateau between Abraham's Creek on the south and Red Bud Run on the north. Rodes' and Wharton's divisions, with Braxton's and King's batteries were at Stephenson's Depot, and Gordon's division at Bunker Hill, under orders to join Rodes and Wharton by sunrise next morning. Cavalry picketed the Opequon and the roads northward and westward on the left, and on the right along the Millwood and Front Royal roads to the Shenandoah. Early had about 15,000 men. Gen. Sheridan, with about 38,000 cavalry and infantry, was at Berryville, east of the Opequon. He had ordered a movement south of Winchester to Newtown, but when he heard that parts of Early's army were at Bunker Hill and Stephenson's Depot, ordered a direct attack on Winchester. Wilson's cavalry division, followed by the Sixth and Nineteenth corps, was to move on the Berryville road, while Torbert, with Merritt's cavalry division, moved to Stephenson's Depot, to join Averell's cavalry division, which was to move up from Darksville. Crook's Eighth corps was to be in reserve at the crossing of the Opequon. Early on the morning of 19 September Wilson was on the road, crossed the Opequon and cleared the way for the infantry. The Sixth corps came up and, under a heavy artillery fire formed line in front of Ramseur, its batteries replying to those of the Confederates. Wilson formed on the left of the Sixth corps. It was nearly noon before Grover's division of the Nineteenth corps was formed on the right of the Sixth, with Dwight's division in reserve. Meanwhile Early had concentrated his army. When Wilson drove in his cavalry pickets on the Opequon at daylight, and the Union movement developed itself, he ordered Gordon and Rodes from Stephenson's Depot, and both arrived before the Union lines were formed, and took position on Ramseur's left, under cover of a piece of woods, Gordon being on the left of Rodes, who had three brigades. At near noon the Union line moved forward; Nelson's artillery on the Confederate right and Braxton's on the left opened a destructive fire; Early ordered Rodes and Gordon to advance from the woods and attack the Union right; and the two lines met in a deadly struggle. Ramseur and Rodes were driven steadily back by the Sixth corps, and Grover's division of the Nineteenth struck Gordon's left, held by Evans' brigade, and drove it back in disorder through the woods from behind which it had advanced. Grover followed to the very rear of the woods, and to within musket-range of Braxton's artillery, which was without support; but Braxton's guns stood to their ground and opened with canister, which checked Grover's advance; and at this moment Battle's brigade of Rodes' division came up, moved forward through the woods, and striking a weak point in the Union line, where the right of the Sixth corps joined the left of the Nineteenth, and joined by the rallied brigades of Rodes' and Gordon's divisions, drove back Ricketts' division of the Sixth corps and Grover's of the Nineteenth, and caused the remainder of the de-

ployed line of the Sixth corps to fall back to the ravine from which it had advanced. But while the Confederates were pursuing Grover, Russell's division of the Sixth corps, which was in second line, charged forward to fill the gap made by the withdrawal of Ricketts, and struck the Confederates in flank, driving them back with heavy loss, and the Union line was re-established, and there was a comparative lull in the engagement, which had been very bloody, and in which Gen. Rodes, one of Early's best division commanders, and Gen. Russell, one of Sheridan's best, had been killed. Crook's Eighth corps, which had been intended to be used on the left to seize the Valley pike south of Winchester, was now brought to the right and its two divisions, forming on the right of the Nineteenth corps, charged and broke Gordon's division. Meanwhile Wilson's cavalry on the left had driven Lomax's cavalry back toward the Valley pike. On the right Merritt's cavalry division, after severe skirmishing, had crossed the Opequon at three fords near the railroad crossing, but was quickly held in check by Wharton's division of infantry and King's battery, which had advanced from Stephenson's Depot to meet it. A severe contest ensued, lasting some hours, both sides gaining and losing ground; but Averell, moving up the pike from Darksville to Stephenson's, driving two cavalry brigades before him, came into the rear of Wharton, while he was engaging Merritt, causing him to abandon his position and fall back at 2 P.M. to Winchester, where two of his brigades were put in reserve, in rear of Rodes' division, one remaining to support the cavalry north of the town. Merritt now advanced and joined Averell, and both moved down on Early's left, driving back the Confederate cavalry, until Merritt joined the right of Crook's troops. Averell and Merritt swung around to the rear of Early's left, driving his cavalry through the infantry lines and compelling him to send two of Wharton's brigades to check them. Crook, who had driven Gordon, now advanced on Wharton's flank and was himself struck by a flank fire. Early was now obliged to yield ground. The Sixth and Nineteenth corps were steadily driving Ramseur's and Rodes' divisions back to Winchester, and Averell's and Merritt's cavalry divisions were charging around his left flank, forcing back his cavalry in some confusion, and attacking his infantry, taking many prisoners from both, until finally, after an unsuccessful effort to hold an intrenched position covering the town, his road to Newtown being threatened, the whole line gave way and retreated, near sundown, some of it in confusion and disorder, some of it in an orderly manner, followed by Sheridan's cavalry to Kernstown, where Ramseur, who was rear-guard, checked pursuit at dark. Early halted at Newtown at midnight, and next morning continued his retreat through Strasburg to Fisher's Hill, Sheridan following to Cedar Creek. The Union loss at the battle of the Opequon was 697 killed, 3,983 wounded, and 338 missing, an aggregate of 5,018. The Confederates lost 276 killed, 1,827 wounded, and 1,818 missing, an aggregate of 3,921. They lost also five guns and nine colors. Consult: 'Official Records,' Vol. XLIII.; Pond, 'The Shenandoah Valley in 1864'; Sheridan, 'Personal Memoirs,' Vol. II.; Early, 'A Memoir of

## OPERA

the Last Year of the War for Independence'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.

E. A. CARMAN.

**Opera**, from the Italian signifying a composition or musical work, is a musical drama, or as the Italians, the originators of the modern opera, term it, *dramma per musica*. In opera or musical drama, music enriched by the accessories of instrumental accompaniment, costumes, scenery, dancing, etc., is an essential part of the work distinguishing it from ordinary drama accompanied by music. According as the serious or comic quality prevails in the opera, it is termed *opera seria* or *opera buffa*. There is also a style — *messo stilo* or *semi-seria* — between both, the limits of which it is practically impossible to define. The component parts of an opera are recitatives, solos, duets, trios, quartets, etc., choruses, and they are usually preceded by an instrumental overture, containing a characteristic blending of the principal themes or *leit-motiven* throughout the opera.

French *opéra comique* and *vaudeville*, the *operetta* of Great Britain, and the United States, the German *singspiele*, and the Spanish *sarsuela*, are short musical dramas of a lighter and mixed character — partly spoken and partly sung; they are in direct contrast to the melodrama of German origin, in which music is introduced either by itself or in connection with the dialogue, no singing, however, taking place.

*Grand opera* is confined to music and song with scenic accessories, the *recitative* or *recitativo* (q.v.) being an essential part of the music. While the opera remains a drama and should never lose this character, song and music may be considered its poetical attributes, the lyric quality of the music being principally directed to the expression of feelings and passions, as comparatively little display of character and action can be expected from opera. An opera, like every work of art, must bear the stamp of unity; one characteristic must prevail through the whole, as the solemn or grave in Mozart's 'Magic Flute,' notwithstanding various naïf passages, the vivid coloring of 'Figaro,' the sublime elevation of Gluck's 'Alceste,' and the heroic in Wagner's various "music-dramas" — as he preferred to call them.

The opera proper is of modern date and Italian origin. The ancient Greek dramas were operatic in character, and the attempts to reproduce the wonderful effects of old Greek music, — confused remembrances of which lingered along the Mediterranean littoral during the Dark Ages, — and to break the fetters of over-elaborated counterpoint, are perceived in the middle of the 16th century by the efforts of Willaert, De Rore, Vincentino, and Venosa to introduce *chromatics* (q.v.), or an intensification of expression, heedless of old rules. About 1600 a powerful impulse was given to music generally by the renaissance and vogue of *monody* with instrumental accompaniment in chords for dramatic singing (*stilo rappresentativo*), whence sprang opera. Earlier symptoms of this musical development and renaissance, however, may be found in the mysteries of the Middle Ages. These pieces frequently had songs introduced into them and sometimes toward the close of the period of their prevalence, whole pieces were sung or rather chanted. The first piece performed in

this way was 'The Conversion of Saint Paul,' produced in 1440. In 1508 a piece called 'Calandra,' set to music, was performed at Urbino, and in 1514 the same piece was performed before Leo X. at Rome. Several years later, the father of the astronomer Galileo produced at Florence his 'Ugolino,' a kind of lyric drama, closely resembling the modern opera, the subject of which was taken from a well-known episode in Dante. About this period, however, pastoral dramas, in which only the prologues and choruses were sung, almost entirely displaced all other modes of theatrical representation, and as already stated, it was not till near the close of the 16th century and about the commencement of the 17th century, that the invention of monody and recitative or spoken music came in to complete the Italian opera. About this time three young noblemen of Florence, who were attracted to each other by a similarity of tastes and pursuits, a love of poetry and music, and are known to posterity as *La Camerata*, conceived the idea of reviving the chanted declamation of the Greek tragedy. They induced the poet Rinuccini to write a drama on the story of Daphne, which was set to music by Peri and Caccini, the most celebrated musicians of the age, assisted by Count Giacomo Corsi, who, though only an amateur, was also, for the period, a good musician. The piece was performed privately in the palace of Corsi; the interlocutors or singers being the author and his friends; the orchestra of this first opera consisted of four instruments, a harpsichord, a harp, a viol di gamba, and lute. There was no attempt at airs, and the recitative — if such it could be called — was merely a kind of measured intonation, which would appear to us insufferably languid and monotonous; yet at the time of its production in 1595 it created an extraordinary sensation, and was frequently repeated. Five years later, 6 Oct. 1600, the first public opera, entitled 'Euridice,' written by the same poet, and with two different musical settings by the same musicians, Peri and Caccini, appeared, both settings being received with equal favor on their production in the Pitti Palace, Florence, during the festivities connected with the marriage of Maria de' Medici with Henry IV. of France. The introduction of Anacreontic stanzas, set to music, and a chorus, at the end of each act were the first imperfect indications of the airs and choruses of the modern opera. Monteverde (q.v.), a Milanese musician, improved the recitative by giving it more flow and expression, and is the first master who displayed genius in operatic composition; he is regarded also as the father of the art of instrumentation. For the court of Mantua, he composed the music to the opera of 'Ariadne,' by Rinuccini (1608); having the year previously produced the brilliant success 'Orfeo.' At Rome, the first performances of *opera seria*, consisting of scenes in recitative and airs, were given from a cart during the carnival of 1606 by the musician Quagliata and four or five of his friends. The first regular serious opera was performed at Naples in 1615; it was entitled 'Amor non ha Legge' ('Love not Bound by Law'). The first *opera buffa* is said to have been represented at Venice in 1624, where also the first stage for operas was erected in 1637.

In the opera 'Giasone,' set by Cavalli and Ciccognini, for the Venetians (1649), occur the

## OPERA

first airs connected in sentiment and in spirit with the dialogue, opening a new path for opera in which the first bright star is Alessandro Scarlatti, the composer of over 100 operas, the chief of which are 'La Rosaura' (1690); 'Teodora' (Rome 1693), in which Scarlatti first introduced the *da capo* of the grand aria, and replaced *secco recitativo* by *recitativo accompagnato*; 'Pirro e Demetrio' (Naples 1694); 'Laodicea e Berenice' (1701); 'Tigrane' (1715); and 'Griselda' (1721). During the latter half of the 17th century, however, opera did not improve but degenerated in Italy, becoming what it was in France later, during the 18th century, a grand spectacle addressed to the eye, in which the poetry and music were the last things considered, while the scenery, mechanical illusions, and pantomime were on the most splendid scale. As Goldoni said long afterward of the grand opera at Paris, "C'était le paradis des yeux et l'enfer des oreilles." (It was paradise to the eyes, and hell to the ears).

Meanwhile opera had been transplanted to France, to Germany, and to England. In France arose Lully, whose chief operas are 'Cadmus et Hermione,' to the libretto of Quinault (1673); 'Alceste' (1674); 'Thésée' (1675); 'Atys' (1676); 'Isis' (1677); 'Psyché' (1678); 'Bellerophon' (1679); 'Proserpine' (1680); 'Le Triomphe de l'Amour' (1681); 'Persée' (1682); 'Phaëton' (1683); 'Amadis de Gaule' (1684); 'Roland' (1685); 'Armide et Renaud' (1686); 'Acis et Galatée' (1687). In Germany arose Keiser with 116 operas, the most popular of which are 'Störtebecker und Goedje Michel'; 'Die Leipziger Messe'; 'Der Hamburger Jahrmarkt'; 'Die Hamburger Schlachtzeit.' In England, Purcell originated a national opera with 40 stage-works, chief of which are 'King Arthur,' text by Dryden (1691); and 'The Faerie Queene' (1692). Outside Italy these are the chief operatic composers of the second half of the 17th century. In the 18th century Handel appeared, and settling in England, by his long list of stage-works, too numerous to detail here (see his biography), effected a complete revolution in English opera, but did not exert a permanent influence, his forte finally discovering itself in oratorio. After Handel, Arne (30 operas), and Shield, are the chief of the English operatic composers of the century, although the first genuine English opera to attain popularity was 'The Beggar's Opera' (1728), set to Gay's libretto by Pepusch. The creation of *opera buffa* (1751), by Pergolesi, 'Serva Padrone,' and 'Mastro di Musica,' and by Logroscino, 'Il vecchio marito,' 'Tanto bene tanto male,' and 'Il governatore,' in opposing itself to the mere manufacture of operas on antique subjects, rejuvenated and revived Italian opera; Cimarosa and Paisiello followed in their footsteps, while in France *opéra comique*, first called *opéra buffon* (1752), had its representatives in Duny, Gossec, Monsigny, Philidor, etc., and in Germany appeared the *singspiele* of Hiller, Schenk, and others. Italian opera did not penetrate into Spain until the second half of the 18th century. At this period also, Gluck appeared in Germany, to exercise an influence on *opera seria*, which has never wholly ceased. At this time the dramatic element was apt to be sacrificed to the musical, and the opera had degenerated to a mere collection of songs connected by recitatives. Gluck

endeavored to make the opera a well-balanced whole in which the music should be subservient to the action of the drama, though he by no means discarded appropriate airs, and introduced also appropriate choruses and other connected pieces.

The Italians draw the line between the *opera seria* and the *opera buffa* much more distinctly than the Germans, so that Italian *opera seria* appears almost insipid to a German; the *buffa*, on the contrary is quite national, and produces a lively effect, when played by Italians. What has been called the romantic opera is of German introduction. In it comic or light and amusing scenes alternate with those of a more serious cast. It was Mozart who brought this class of opera to perfection, and his 'Don Giovanni,' 'Magic Flute,' and 'Mariage de Figaro' are unsurpassed, perhaps are unsurpassable in their genre. Beethoven's single opera, 'Fidelio,' in some respects may be said to stand alone. But at the head of the modern school of German operatic composition stands Richard Wagner (q.v.), whose master-mind raised romanticism to its highest power, and while enriching the means of musical expression in an unparalleled manner, accomplished a reaction against the overgrowth of the melodic element similar to that of the Florentines and of Gluck, depriving the vocal music of the piece of the prominent place formerly assigned to it, and making it subordinate to the other three elements of an opera—text, instrumentation and scenic decoration. His *magnum opus* is the magnificent tetralogy, 'Der Ring des Nibelungen,' comprising a sequence of four musical dramas, 'Das Rheingold,' 'Die Walküre,' 'Siegfried,' and 'Götterdämmerung,' first performed entire at Baireuth in 1876. Other notable works are 'Tannhäuser,' 'Lohengrin,' and 'Parsifal.'

The chief Italian operatic composers include, besides those already mentioned, Sacchini, Piccini, Buononcini, Porpora, Jomelli, Cherubini, Rossini, Bellini, Donizetti, and the versatile maestro Verdi, whose 'Otello' (1887) and 'Falstaff' (1893) may be said to be up to the present time the last of the *chef-d'œuvres* of opera. Among contemporaneous Italian composers are Boito, Puccini, Franchetti, Giordano, Spinelli, Mascagni, and Leoncavallo. The German composers besides Gluck, Mozart, Beethoven, and Wagner, include Handel, Hasse, Theile, J. W. Franck, Keiser, Mattheson, Telemann, Weber, Spohr, Flotow, Marschner, Lortzing, Cornelius, Nicolai, Johann Strauss, Von Suppé, etc., and among contemporaneous celebrities are Richard Strauss, D'Albert, Bungert, Humperdinck, Goldmark, Schillings, Kienzl, Weingartner, Siegfried, Wagner, and others. Meyerbeer, though German by birth, belongs rather to the French school, the chief representatives of which are Grétry, Monsigny, Méhul, Le Sueur, Boieldieu, Auber, Berlioz, Halévy, Herold, A. Thomas, Gounod, Saint-Saëns, and César Franck (a Belgian). Among the composers of French *opéra comique* are Offenbach, Lecocq, Bizet, Hervé, Planquette, Audran, Delibes, Massé, Massenet, De Joncières, Bruneau, Charpentier, D'Indy, and Lalo. Among Russian operatic composers are Borodin, Cui, Glinka, Rimsky-Korsakoff, Rubinstein, and Tschaikowsky. Poles are represented by Scharwenka, Moritz, and Paderewski; Bohemians by Smetana and Dvorak. In the British school of

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modern opera are Balfé, Wallace, Benedict, Macfarren, Sullivan, Mackenzie, Thomas, Cellier, Stanford, and MacCunn. Chief of these is Sir Arthur Sullivan, whose operatic fame rests on a long list of *opera buffa*, composed to the sparkling *libretti* of W. S. Gilbert, his *opera seria*, the 'Golden Legend,' and scholarly 'Ivanhoe,' not meeting with the success due to their merits.

Italian opera was first introduced into the United States in the autumn of 1825, when Garcia's daughter, afterward famous as Malibran, appeared in Rossini's 'Barber of Seville,' at the Park theatre in New York. Among the earliest attempts to create an American national opera were those of Luigi Arditi and Max Maretzek who, about 1856 and subsequently, produced 'Rip Van Winkle,' 'The Spy,' 'Sleepy Hollow,' and 'Uncle Tom's Cabin,' described as "the four best American operas ever written," which "had they been first brought out in Paris or London would have become popular there, and would have been imported to this country with a flourish of trumpets." To these may be added 'The Scarlet Letter' of Walter Damrosch. The modern native productions of *opera buffa* partake more of the character of musical farces; notable exceptions are the works of Reginald de Koven and Victor Herbert, due chiefly to the clever *libretti* of H. B. Smith.

Consult: Aphorop, 'Opera, Past and Present' (1901); Elson, 'A Critical History of Opera' (1901); Streatfield, 'The Opera' (1901); Upton, 'The Standard Operas' (1891).

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**Opera Bouffe** (boof), a farcical form of opera in which the characters, subject-matter, and music is intended to burlesque the more serious style of opera. Pergolesi was the creator and Offenbach the chief master in this art. The comic operas of Gilbert and Sullivan, both in the character of the music and the *libretti*, stand by themselves. Comic opera is the generally accepted present day term for opera bouffe.

**Opera-glass** (Fr. *lorgnette*), a double telescope, used for looking at objects that require to be clearly seen rather than greatly magnified, such as adjoining scenery and buildings, the performers at a theatre or opera, etc. The opera-glass is short and light, and can be easily managed with one hand. Its small magnifying power (from two to three at the most), and the large amount of light admitted by the ample object-glass, enable it to present a bright and pleasant picture, so that the eye is not strained to make out details, as in telescopes of greater power, which generally show a highly magnified but faint picture. It allows the use of both eyes, which gives to the spectator the double advantage, not possessed by single telescopes, of not requiring to keep one eye shut (a somewhat unnatural way of looking), and of seeing things stand out stereoscopically as in ordinary vision.

The opera-glass is the same in principle as the telescope invented by Galileo. It consists of two lenses, an object-lens and an eye-lens. The object-lens is convex, and the eye-lens concave. They are placed nearly at the distance of the difference of their focal lengths from one another (see TELESCOPE). The opera-glass need not be set to a precise point, as is necessary with ordinary terrestrial telescopes, for the lengthen-

ing or shortening of the instrument does not produce so decided an effect on the divergence of the light; the change of divergence caused by screwing the opera-glass out or in is so slight as not much to overstep the power of adjustment of the eye, so that an object does not lose all its distinctness at any point within the range of the instrument. There is, however, a particular length at which an object at a certain distance is most easily looked at. The two telescopes of the opera-glass are identical in construction, and are placed parallel to each other. The blending of the two images is easily effected by the eyes, as in ordinary vision. The cheapest opera-glasses consist of single lenses; those of the better class have compound achromatic lenses. A very ordinary construction for a medium price is to have an achromatic object-glass, consisting of two lenses, and a single eye-lens. In the finest class of opera-glasses, which are called field-glasses, both eye-lenses and object-lenses are achromatic. Plossl's celebrated field-glasses (Ger. *Feldstecher*) have 12 lenses, each object-lens and eye-lens being composed of three separate lenses. See LENS; OPTICS; TELESCOPE.

**Operations, Dental.** See DENTISTRY.

**Operations, Military.** See MILITARY SCIENCE; TACTICS, etc.

**Operations, Surgical:** Measures other than medical for relief of conditions resulting from disease or accident, and generally involving the use of cutting instruments or of apparatus. Surgical operations include those mentioned below.

**Reduction of Fractures.**—This process consists in so manipulating the fragments of bone as to bring them into proper position and free them from intervening tissue, and then, by immovable apparatus, retaining them in position till union takes place from the growth of new bone or of ligament. Flat or rounded splints of wood, of sole-leather, of prepared felt, or of pasteboard are used, or bandages impregnated with silicate of soda (water-glass), or with plaster of Paris.

**Reduction of Dislocations.**—The displaced bone is manipulated by the surgeon in such a way as to force it to re-enter its socket through the tear made in its capsular ligament in its exit. Leverage is used, with a hand or foot or opposing muscles as a fulcrum, and retaining apparatus is applied to secure rest till swelling and other inflammatory symptoms cease.

**Amputations and Disarticulations.**—Amputations consist in the removal with the knife of some part of the body, as an arm, a breast, etc. In the amputation of a limb, the soft parts, after being cut through, are retracted so as to allow the bone to be sawed off as far back in the flesh as possible. This procedure provides, after tying all bleeding arteries and cleansing the surfaces, for covering in the bone deeply with muscle and skin flaps. Before beginning the amputation of a limb, a tight rubber band is applied about it, so as to prevent hemorrhage when the arteries are severed. After these are tied, the band is removed. A disarticulation is an amputation through a joint. Skin and flesh flaps are provided, and the bone's end is well covered. In all amputations of limbs the cutting is so done that the scars resulting shall not be located so as to prevent the adjustment of an

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artificial limb. Many ingenious amputations of special parts of the body have been devised, as of the foot. In one of these, parts of two bones are removed, and the remnants are brought into apposition, so that they unite. This is termed osteoplasty.

**Ligation of Arteries.**—This is an important and very frequent procedure in surgical operations. An artery may be tied in continuity in cases of hemorrhage, or aneurism, etc. In such cases the artery is exposed and a blunt-end needle, with an eye near its tip, is loaded with the chosen ligature, and hooked under the vessel. The ligature is caught by the surgeon with a forceps, and pulled through while the needle is withdrawn. The ends of the ligature are then tied above the artery. An artery may be tied when bleeding in the stump of an amputation. Catgut, silk, kangaroo tendon, and silk-worm gut are the chief varieties of ligature used. An artery is sometimes held with pins thrust through the adjacent flesh, so as to compress the vessel (acupressure), or it may be closed by being twisted at its extremity (torsion).

**Excision and Resection.**—Excision is the removal of a portion of the body by cutting it from the surrounding tissues. If a portion of bone or a joint be removed, the operation is termed a resection. Excision may be desirable in the case of a tubercular joint or a necrotic bone, or in hip-joint disease, for example.

Besides these general measures, many special operations are performed. These include, beside many others, those mentioned below:

**Plastic Operations Upon the Face.**—In these, skin from forehead or cheeks is taken to repair, for example, a nose or a lip which has been lost or excised because of disease. In some cases a finger, or the skin of the arm, may be used for this repair, the hand being fastened to the head for a few days before the transplanted part is entirely severed from its original site.

**Tracheotomy.**—This is the operation of opening into the trachea or windpipe through the neck, in order to insert a tube through which the patient may breathe during closure of the throat from diphtheria, or swallowing a foreign body, or other cause. A modification of this is laryngotomy, in which the opening is made through the larynx, below the vocal cords.

**Paracentesis.**—Puncture into the pericardial or pleural cavity to draw off fluid thence.

**Operations on the Kidney.**—These include that of cutting the kidney open to remove a stone, or a new growth, or to drain off fluid (nephrotomy); suturing it to the abdominal wall to prevent floating; incising and stripping off the capsule in cases of Bright's disease (nephropexy); and removal of a kidney (nephrectomy).

**Appendectomy.**—This is removal of the vermiform appendix, a procedure necessary in many cases while the acute inflammatory process of appendicitis is in progress. In some cases where perforation has not occurred, an "interval operation" is done, after the subsidence of the acute attack and before the incidence of another one. An incision is made a few inches above the groin, in the right side of the abdomen; all adhesions between coils of the intestine are divided; the appendix is found, and is cut off close to the point of emergence from the cæcum,

and its stump is inverted into the intestine and fastened with sutures of catgut. The peritoneal cavity is then washed out, and the abdominal wound is closed around a drainage tube. It is now advised that operation be done very early, and the possibility of fatal peritonitis be averted.

**Operations on the Nerves.**—These may be necessary to suture divided nerves together, to resect parts of nerves, or to remove ganglia in severe neuralgic affections.

**Trephining.**—This is opening the skull by means of the trephine, an instrument which removes a button of bone. Resort is had to it in order to explore the brain with needles or canulæ in search of abscess, hæmatoma, or cyst; to elevate depressed portions of a fractured skull, and to pick out fragments of bone; to expose a sinus because of thrombosis or suppuration; or for intracranial hemorrhage. The operation is also performed for the purpose of exposing various arteries and nerves. The "mastoid operation," which is frequently undertaken for middle-ear suppuration, is substantially as follows: An incision is made through the soft parts down to the bone back of the auricle on the affected side, from the tip of the mastoid process to a point opposite the upper limit of the auricle. Bleeding vessels are secured, and the periosteum is separated from the bone as far forward as the meatus. A bony projection which is thus uncovered is cut away with a chisel or gouge, and some of the cortical layer of the bone over the antrum is removed. The mastoid cells are easily reached, softened bone is scraped away, and exudate is removed from the tympanum. In some cases two of the small bones of the ear, the incus and malleus, must be removed. (See EAR.) Proper drainage is arranged through the wound and the meatus, and sutures are put in. Consult Park, 'Surgery by American Authors' (1901); Kocher, 'Text-book of Operative Surgery' (1903).

**Operculum**, in conchology, the horny or limy plate developed upon the "foot" of many gasteropods, serving to close the aperture of the shell when the animal has withdrawn into its abode. The operculum is a cuticular development on the dorsal side of the foot, behind the shell. It is present in nearly all land, freshwater and marine *Prosobranchiata*, is absent in all *Opisthobranchiata* in the adult state, except *Actæon*, and in all *Pulmonata* except *Amphibola*, and has been lost in several familiar families, as the cones, mitres and cowries. As a rule the operculum exactly fits the aperture, and hence it varies in outline in different groups; but in some cases where the aperture is very large it closes it only in part. Other abnormalities exist; and in general the operculum is a variable character of little if any value in classification. The theory formerly held that this excrescence was homologous with a second valve, or with the byssus of bivalves, is not now considered justified by facts. Use has been found for certain round, thick, and concentric opercula, to represent the eyes in rude human figures made by South Sea islanders; and as eyestones,—small fenticular and smooth ones, as of small turban-shells, which may be slipped easily around the ball of the eye beneath the eyelid, and bring out intruding and painful objects caught there.

**Operetta.** See **OPERA**.

**Operti**, ô-pâr'tê, **Albert** (JASPER LUDWIG ROCCABIGLIERA), Italian artist: b. Turin, Italy, 17 March 1852. He entered the British navy as midshipman, but resigned in 1868. He then elected the career of a painter; was illustrator, caricaturist and scenic artist in New York, and accompanied Lieutenant R. E. Peary on two Arctic expeditions, during which he acted as New York *Herald* special correspondent (1896-7). From the studies made during his northern voyages he executed his well known 'Rescue of the Greely Party' and 'Farthest North' (for the Army and Navy Departments, Washington); 'The Schwatka Search'; 'Finding De Long in the Lena Delta'; and 'Dr. Kane.' He was selected as artist by the United States government to the World's Columbian Exposition.

**Ophelia**, ô-fê'lî-a, in Shakespeare's play of 'Hamlet,' the daughter of Polonius. Hamlet, with whom she is in love, having unintentionally killed her father in his madness, turns away from Ophelia, whose reason is now overthrown; and in the various phases of her derangement the drama presents its tenderest scenes of pathos. While gathering flowers, Ophelia is drowned.

**Ophicleide**, ôf'î-klîd, a brass wind-instrument of music invented about 1790 to supersede the serpent. It generally consists of a wide conical tube bent double with a bell-mouth, and has eleven keys and a cup-shaped mouth-piece. Its compass ranges a little over three octaves (or thirty-eight semitones), namely from the B flat one semitone below the lowest note of the violoncello to C in the treble stave, and it is capable of very accurate intonation. It is used in orchestras, and is capable of very pleasing effects as a solo instrument, but is all but superseded by the saxhorn (q.v.).

**Ophidia**, an order of reptiles containing the serpents,—sauroians in which the right and left halves of the lower jaw are connected by an elastic band. (See LIZARDS.) The appendages and shoulder-girdles are typically absent, although in certain families rudiments of the posterior appendages and pelvis still persist. The quadrate is not fixed, and, acting as the suspensor of the lower jaw, gives a surprising capacity for swallowing. The number of vertebrae is great. The skin is covered with horny scutes, which are periodically shed with the cuticle. The eyes are without lids. The sense of smell is acute. The left lung is smaller than the right and may be quite rudimentary. A few snakes are viviparous. The *Ophidia* seem to have arisen from lizard-like ancestors in Tertiary times. They are now nearly cosmopolitan, only the coldest countries and certain large islands (New Zealand, Ireland) being devoid of them. See SERPENTS.

**Oph'iocephalus**, the type-genus of the family *Ophiocephalidae*, containing the curious East Indian fishes called Serpent-heads.

**Oph'ioGLOSSA'LES**, the grape fern. See FERNS.

**Ophir**, ô'fêr, a place mentioned in the Old Testament scriptures from which the ships of Solomon brought large quantities of gold, sandal-wood, and ivory wherewith to adorn the king's house, then building at Jerusalem. There are different opinions about its exact situation. Some scholars place it in northern Asia, others

in India, and America has likewise been mentioned as comprising Ophir. Later it has been located in the East Coast of Africa.

The explorer and traveler Baer identifies Ophir with Malacca. Lassen's view that Ophir is the Semitic name for the "Abhira," a pastoral people in Northern India, seems best grounded, and the land of Ophir is the territory they inhabit. This Ophir has no connection with the same word occurring in Genesis x. 29.

**Oph'ite**, in mineralogy, formerly a synonym for serpentine (q.v.); now a basic rock of greenish color and eruptive origin, with an exterior resemblance to serpentine, occurring especially in the Pyrenees. Its texture is intermediate between granite and porphyry, and its structure is characterized by the incomplete crystallization of its parts, some being completely crystallized and others entirely amorphous, a phenomenon called ophitic structure.

**Ophites**, ôf'its (Gr. *ôphus*, a serpent), a Gnostic sect of the second century who worshipped a living serpent. They considered that the serpent in Eden by misleading Eve was the liberator of man from the power of Jehovah, whom they regarded with abhorrence. See SERPENT-WORSHIPPERS.

**Ophiuchus**, ôf-i-û'käs, in astronomy, an ancient northern constellation, representing a man holding a serpent; called Serpentarius, the Serpent-bearer. It has about 80 stars visible to the naked eye.

**Oph'iuroidæa**, a class of the phylum *Echinodermata*, embracing the slender-armed sand-stars. It is divisible into two orders: (1) *Ophiurida*, in which the arms are simple (see BRITTLE-STARS); and (2) *Euryalida*, in which the arms are branched (see BASKET-FISH).

**Ophthal'mia**, inflammation of the eye; a general term used by the older writers, but at the present day either not employed by oculists, or applied by them only to conjunctivitis (inflammation of the conjunctiva) or to conjunctivitis and inflammation of the eyelids. There are various grades and types of conjunctivitis, all of which have to a greater or less extent the following symptoms in common: photophobia—aversion to or intolerance of light; an increased and usually altered secretion; and injection of the blood-vessels, accompanied sometimes with a slight velvety opacity, or special products, a false membrane, granulations, etc. In all forms of conjunctivitis there is need of cleanliness, antiseptic washes, poultices, protection from excess of light and injuries, dust, etc. In most forms the case should be under the care of a physician.

**Simple Conjunctivitis**.—This is catarrhal conjunctivitis, characterized by congestion, a feeling as of the presence of a foreign body, lessened transparency of the conjunctiva of the lids, and a discharge, at first watery, then acrid, excoriating the cheeks, may become mucous or mucopurulent, gluing the eyelids together. Usually the vision is clear, but it may be hazy if the secretion is more than watery. Micro-organisms, neglect of treatment, filth, and the scrofulous diathesis may convert a simple conjunctivitis into a purulent and more or less communicable or infectious disease. Usually the prognosis is good, recovery occurring in a few days.



## OPHTHALMIA

*Varieties of Simple Conjunctivitis.*—Associated conjunctivitis occurs sometimes with eczema, facial erysipelas, bronchitis, and other disorders; exanthematous conjunctivitis (ophthalmia morbillous, ophthalmia scarlatinous, etc.) may accompany or follow exanthematous diseases such as measles or scarlet fever; mechanical conjunctivitis is caused by wind, tobacco-smoke, dust, or injuries; toxic conjunctivitis by exposure to the influence of certain chemicals, aniline dyes, chrysophanic acid, etc., or by the prolonged use of atropine, eserine, cocaine, etc.; and symptomatic conjunctivitis from the strain of the eyes in defective vision. For treatment, remove the cause, if possible, and alleviate associated conditions. Wash the eye frequently with cold or hot water, as agreeable, but do not rub it. As a wash or spray, ten grains of boric acid to an ounce of water will be of service. When the discharge is mucopurulent, stronger applications are necessary.

*Acute Contagious Conjunctivitis.*—Known also as acute mucopurulent conjunctivitis, epidemic conjunctival catarrh, and pink-eye, this was formerly classified as a severe form of simple conjunctivitis. It is distinctly contagious, attacks persons of all ages, is believed to be due to specific bacilli, resembles at first simple conjunctivitis, then the discharge is mucopus or purulent, the conjunctiva is much swollen, and even chemotic, and the lids may be œdematous and glued together. Prognosis is good, but relapses are common, recovery taking place usually in about two weeks. Treatment is similar to that of simple conjunctivitis. The affection being contagious, all sources of such contagion as is due to towels, sponges, etc., must be discarded.

*Purulent Conjunctivitis.*—This acute blennorrhœa of the conjunctiva is of two forms, that of the new-born (ophthalmia neonatorum), and the gonorrhœal conjunctivitis of adults. Conjunctivitis neonatorum, characterized by severe pain, great swelling of the eyelids, serous infiltration of the conjunctiva, and a copious discharge of contagious pus, is caused by the introduction into the eye of infecting material (sometimes gonorrhœal), usually from some portion of the genito-urinary tract of the mother, at the time of or shortly after the child's birth, or from soiled towels, etc. The chief risks are cohesion of the eyelid and eyeball, opacity, ulceration of the cornea, and sometimes perforation. Prognosis is grave, but treatment is generally successful if a competent physician has charge while the cornea is still clear. Cold compresses at first, then hot fomentations, constant gentle removal of the discharge, at first a mild eye-wash, as before indicated, later the introduction of a solution of nitrate of silver (Crede's plan) or other substances, absolute cleanliness, and the destruction of lint, cotton, or any infected substance, comprise the measures of relief.

*Gonorrhœal Conjunctivitis.*—This affection (purulent ophthalmia, acute blennorrhœa in adults) is usually caused by contagion from an acute gonorrhœa or a gleet, or from a similarly affected eye, through fingers, linen, towels, etc., though it may arise from a vaginal leucorrhœa, diphtheria, and other causes. The symptoms are similar to those which appear in the purulent conjunctivitis of the new-born but more severe, and the treatment should be entirely in

the hands of the physician. The vitality of the cornea is in constant danger; ulceration and matting together of the iris and cornea, inflammation of the choroid, iris, etc., and even destruction of the eye may occur. The disease may become chronic and one of the forms of chronic conjunctivitis.

*Croupous or Pseudomembranous Conjunctivitis.*—Of this, which is plastic membranous conjunctivitis, there are two forms, one quite mild, usually attended by a soft, painless swelling of the lids, a membranous exudation upon the conjunctiva, and generally a scanty seropurulent discharge occurring before the seventh year. The cause is not known. The second form is rapid in development, is attended with much swelling and discharge, and may quickly destroy the cornea. Frequent removal of the discharge with a solution of common salt, cold compresses, and the use of nitrate of silver, etc., are the measures employed for relief. The affection occurs with measles, scarlet fever, influenza, and non-febrile disorders.

*Diphtheritic Conjunctivitis.*—This form usually occurs in young children, either mildly with pseudomembranous formation, or in a deep-seated character, necrotic, with a very painful board-like exudative swelling of the lids and a scanty seropurulent or bloody discharge. Sloughing of the cornea may occur. Prognosis is grave. Cleanliness, antiseptic washes, and building up the tone of the body are necessary.

*Phlyctenular Conjunctivitis.*—Also called phlyctenular ophthalmia, scrofulous ophthalmia, eczema of the conjunctiva, characterized by one or more grayish, sometimes purulent elevations, generally on the eyeball portion of the conjunctiva. It occurs in strumous and badly nourished children, and tends to a disease of the cornea (phlyctenular keratitis) and to its opacity. Attention to hygienic measures, good food, etc., tonics, mild eye-washes, followed by the application of an ointment of the yellow oxide of mercury, are requisites of treatment.

*Spring Conjunctivitis.*—Considered by some writers as a distinct disease, by others as a form of chronic conjunctivitis. This occurs mainly among children in the spring and summer, and is always bilateral. There is stinging pain, considerable mucous secretion, and the formation of gray semi-transparent nodules, which swell and overlap the edge of the cornea. Prognosis favorable except for relapses. Treatment requires protection of the eyes with dark glasses, weak astringent and antiseptic lotions, and perhaps destruction of the granulations and hypertrophic masses.

*Follicular Conjunctivitis.*—Follicular ophthalmia, characterized by small pinkish prominences mainly in the conjunctiva of the lids, usually in rows. It is the result of bad hygienic surroundings, as in crowded tenements and pauper schools, where it may be epidemic. It is allied to granular lids. The prognosis is good, but the disease is troublesome, and often lasts for months. The treatment consists in general hygienic measures, and certain stimulating and antiseptic applications.

*Granular Conjunctivitis.*—Granular ophthalmia, Egyptian ophthalmia, military ophthalmia, known as trachoma, and, popularly, as granular lids. It occurs in acute and chronic forms, is infectious and sometimes widespread, and

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although affecting mainly persons of poor health and in bad hygienic surroundings, it may attack those in good health. The symptoms of the acute form are: swollen lids; reddened conjunctiva; hypertrophied papillæ, between which are non-vascular, roundish granulations; scalding tears; intense photophobia; pain in the brow and temple; and mucopurulent or purulent discharge. In the chronic form, there is less of pain, redness and other results of inflammation; the conjunctiva is roughened; the granulations degenerate and soften. In both forms there is danger of cloudiness and ulceration of the cornea, and of scars with consequent deformities of the lid and its border. The sufferers should shut out the light and keep the eyes most of the time partly closed. The treatment in earlier stages calls for soothing remedies; in chronic or severe cases, caustics and astringents, operative procedures, and general medication.

So prevalent is trachoma in cities, especially in the crowded tenement districts, that the health authorities now treat affected children at the schools and in their homes, thereby greatly limiting the spread of the disease and checking defects in vision. The work done on these lines in the city of New York since 1902 has been particularly noteworthy. Trachoma, mainly brought here by Russian Jews and other immigrants from unclean environments, and which rapidly spreads by contagion, was making inroads among the more exposed children of the public schools, and threatening not only the health of New York, but, more remotely, that of the country at large. The board of health took vigorous measures for its suppression. Every child in the public schools was subjected to medical examination by experts appointed by the board, and in cases of slight affection parents were notified and instructed in the necessary precautions of cleanliness, etc.; in more advanced cases the children were taken out of school, isolated at home, and there treated; and in extreme cases still more rigorous methods were adopted. At the same time all teachers in the public schools were required to observe and report upon the slightest appearance of the disease, in order that affected children might be promptly excluded. Within two years the most remarkable results were attained; trachoma was almost eradicated from the city, and it has been demonstrated that the disease, under vigilant administration of public health officials, can be brought and kept under control.

*Subacute Conjunctivitis.*— Sometimes chronic, this appears in association with a diplobacillus, is insidious, runs a course of six weeks to six months, is characterized by redness of the edges of the eyelid, congestion, and hypersecretion of the conjunctiva. Treatment is the same as in simple conjunctivitis, with the addition of zinc-sulphate solution.

*Pavinaud's Conjunctivitis.*— This form, usually unilateral, is rare. It was first described by Pavinaud and believed to be due to infection of animal origin. The symptoms are swelling of the lids, mucopurulent discharge, large polypoid granulations, with ulceration between them, and lymphatic involvement. It usually lasts from one to several months. Treatment includes antiseptic washes—nitrate of silver or sulphate of copper—and surgical removal of granulations.

*Chronic Conjunctivitis.*— Chronic ophthalmia: it may be either an independent affection or the result of an acute blenorrhœa. As an independent disorder, it occurs mainly in elderly people. The symptoms are hyperæmia, soreness and thickening of the edge of the tarsal conjunctiva, swelling of the caruncle, and slight mucopurulent discharge. Treatment: antiseptic lotions, astringents, attention to the tear-ducts and refractive errors, and cleanliness. Lacrimal conjunctivitis is a form of the above, depending upon obstruction of the lacrimal passages.

*Egyptian and Military Conjunctivitis.*— These are terms loosely used for all forms of conjunctivitis occurring in barracks and crowded assemblies, more or less epidemic and chronic, and attended by a mucopurulent or purulent discharge.

*Ophthalmoscope*, ôf-thäl'mô-skôp, an instrument for examining the interior of the living eye, invented in 1851 by Prof. Helmholtz, who showed that by illuminating and examining an eye in the same direction, its deeper parts can be rendered visible. The form now generally in use consists of a concave mirror of about 10 inches focus, one to three inches in diameter, with a small hole in the centre; and certain lenses to use with it. Examination is facilitated by dilating the pupil of the observed eye with atropine or homatropine; and for a complete examination this is indispensable. The person whose eye is to be examined is seated in a dark room, with a bright light on a level with his eye by the side of his head. The observer sits opposite him, and placing the mirror close to his own eye, and about 18 inches from the eye to be examined, reflects the light upon the latter, while he looks at it through the hole. The pupil in a healthy eye appears bright red or orange; opacities in the lens or vitreous humor appear black. The details of the retina, choroid, etc. (or *fundus*), can be seen in two different ways. In the *indirect method* the observer, seated as above described, holds the 2½ inch convex lens about three inches from the eye under examination, between it and his own, when a clear image of part of the fundus, inverted and magnified about four diameters, appears in the red light of the pupil. In the *direct method*, the observing eye must be placed as close to the observed as the intervention of the mirror will allow, when an image of a smaller part of the fundus is seen but erect and magnified about 14 diameters. The fundus appears orange or red, varying in different individuals. The blood-vessels of the retina are seen as darker red lines coursing over it. The entrance of the optic nerve, commonly called the disk, from which these vessels diverge, appears as a round disk of a much paler color.

*Opie*, ô'pî Amelia Aldersann, English novelist: b. Norwich, England, 12 Nov. 1769; d. 2 Dec 1853. She was married to John Opie, the well-known portrait painter in 1798. In 1801 she published 'Father and Daughter,' a novel which at once attracted attention. After the death of her husband in 1807 she returned to her father's home and subsequently joined the Society of Friends. She published: 'Adeline Mowbray' (1804); 'The Warrior's Return and Other Poems' (1808); 'Madeline' (1822);

'Lays for the Dead' (1833); etc. Consult the Life of Mrs. Opie by C. L. Brightwell.

**Opie, John**, English painter: b. Saint Agnes, Truro, Cornwall, May 1761; d. 9 April 1807. When about 19 he was taken to London by Dr. Wolcott ("PETER PINDAR"), who befriended him in various ways. Through the influence of his patron he acquired great fame as a portrait painter, became known as the "Cornish Wonder," and while this season of favor lasted, realized a moderate fortune. He then turned to historical painting, and produced his 'Murder of James I. of Scotland'; 'Slaughter of Rizzio'; 'Jephtha's Vow'; etc. His 'Slaughter of Rizzio' was exhibited in 1787, and secured his election to the rank of associate to the Royal Academy. In 1788 he was appointed a Royal Academician. In 1805 he was elected professor of painting in the Royal Academy, but only delivered four lectures before his death, and these with a memoir by his wife were published in 1809. He is also the author of the biography of Sir Joshua Reynolds in Wolcott's edition of Pilkington's 'Dictionary of Painters' and of 'An Inquiry into the Requisite Cultivation of the Arts in England,' which among other influences led to the formation of the National gallery.

**Opisthoglyph'a**, one of the two groups, the other being *Proteroglyph'a*, into which venomous serpents (q.v.) are divided according to the anterior or posterior position respectively of the poison-conducting teeth. The snakes of the first group are included in the family *Colebrida*, and are represented by the neotropical tree-snakes (*Dipsas*), the European cat-snake, and the Oriental *Homalopsis*. In their case one or a few of the posterior maxillary teeth have a groove or furrow in front, which conducts the secretion of the enlarged upper labial glands into the wound. These opisthoglyphs comprise about 300 species and are of considerable morphological interest, since they connect the *Colebrida* with the *Viperida*, the characteristic (proteroglyph) poisonous apparatus of which seems to have been derived from that of the *Opisthoglyph'a* by the reduction or shortening of the anterior portion of the maxillaries and the harmless teeth so that the posterior or poison fangs come to the front. The *Proteroglyph'a*, then, are those serpents, such as the cobras and coral-snakes (*Elapina*), sea-snakes (*Hydrophina*), vipers and rattlesnakes, whose poison fangs are in the front part of the mouth.

**Opitz, 3'pits, Martin**, German poet and critic, the "Father of modern German poetry": b. Bunzlau, Silesia, 23 Dec. 1597. He was educated at Heidelberg, where he became the centre of a circle of young poets, fled to Holland in 1620 to escape the plague, returned to Silesia in 1622, taught for a time, in 1625 was ennobled and crowned with laurel for his poetic fame by the Emperor, from 1628 to 1632 was secretary of Dohna, the persecutor of Silesia, and then became the client of Ulrich of Holstein, as ardent a Protestant as Dohna was a Catholic. But the story of his life, with its changing of sides and its petty flatteries is less important than his literary work. When scarcely 21 he wrote 'Aristarchus, sive de Contemptu Linguae Teutonice,' urging the infusion of classical imitation into German poetry; and in 1624 this German Boileau published 'Das Buch von der

deutschen Poeterey,' which insisted on accent in place of mere numbered syllables and in many other respects made possible the revival of German poetry in the 17th century. His poetical work was correct, unoriginal, and various, including manifold versions and imitations; the antiquarian epic 'Zlatna' (1623); the 'Trostgedichte in Widerwärtigkeiten des Krieges' (1633), the best of his metrical attempts; 'Deutsche Poemata,' a book of selections; and a pastoral 'Die Nimfe Hercine' (1630). Consult the German biographies by Strehlke (1856), Palm (1862), and Hoffmann von Fallersleben (1858); and Perry, 'From Opitz to Lessing' (1884).

**Opium**, the dried milky juice of the unripe capsules of a poppy (*Papaver somniferum*), which for this product has been cultivated through many centuries. Every species of poppy is capable of yielding it to a greater or less extent. Opium is procured by making incisions in the poppy-head or capsule, taking care not to penetrate its cavity; the juice then exudes in drops, and after being allowed to remain for a day upon the edges of the incisions, it is scraped off—a brownish, jelly-like material. As the soft opium accumulates it is molded into roundish lumps or irregular flattened cakes, of various sizes, and put aside to dry. When of proper consistency it is generally wrapped in leaves and sent to market. When fresh the lumps and cakes are plastic, becoming harder on the exterior, are of a chestnut or darker brown, and have a disagreeable, even sickening odor, and a bitter nauseous taste. Sometimes opium of commerce is mixed with pebbles, shot, ashes, clay, sand, and with resinous, saccharine, and mucilaginous substances, and has an excess of moisture. Opium is a complex substance. "It ordinarily contains an odorous principle, glucose, gum pectin, a compound resembling caoutchouc, wax, fat, resin, coloring matter, and plant-tissue," also the neutral principles meconin and meconoisin, and meconic acid and thebolactic acid, similar to lactic acid. The most important of the derivatives obtained from opium are its alkaloids, 19 in number. In all probability the poppy was originally brought from Asia Minor. It is now grown extensively there, and in Egypt, India, Persia, China, and Japan, less extensively in several parts of Europe, especially France and Germany, and in the United States. As an ornamental flower it is cultivated in nearly all temperate countries.

The principal varieties of the opium of commerce include Turkey opium, used principally in Europe and America; Persian, of variable quality, seldom used in this country; East Indian, rather a poor variety, used at home and exported to China and other Asiatic countries; Chinese, consumed in the East, largely for smoking.

**Alkaloids of Opium.**—Those at present recognized are morphine, which crystallizes in white needles, and which was discovered in 1816 by Sertürner; narcotine (shining prisms or long needles, tasteless, odorless), discovered in 1803 by Derosme, although its basic nature was first shown by Robiquet in 1817; codeine (nearly colorless octahedra), discovered in 1832 by Robiquet and described by Grimaux in 1881; prepared from morphine by heating it with methyl iodide and soda, it is methylmorphine; narceine or narcea (long quadrangular prisms or white

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silky needles, odorless), discovered in 1832 by Pelletier; pseudomorphine (fine crystalline powder, derived from morphine), also called phormine and oxydimorphine, discovered in 1835 by Pelletier and Thibournevy; thebaine or paramorphine (silver scales or prisms with styptic taste), discovered in 1835 by Thibournevy; paparenine (colorless needles or prisms), discovered by Merck in 1848; rhoeadine (white tasteless prisms), discovered in 1865 by O. Hesse; cryptopine (minute prisms), discovered in 1867 by T. and H. Smith; oxynarcotine (isolated from the mother liquor of narceine), discovered in 1876 by Wright and Beckett; gnoscopine (woolly needles, obtained from narceine), discovered in 1878 by T. and H. Smith. In 1870-8 O. Hesse announced the discovery of lantropine (finely crystallized), meconidine (amorphous, not stable), laudanine (large crystals), codamine (crystalline), deuteropine, laudanoline (crystallizable), and protopine (crystallizable). The discovery of hydrocatarrine (crystallizable) was announced in 1869 by Mathieson and Wright. Apomorphine or apomorphia, derived from morphine or codeia, although a depressant, is a prompt and valuable emetic.

Of the alkaloids of opium, morphine, codeine, and narceine are of most importance. Morphine in its action on the body very nearly represents that of the crude drug. The average dose of opium for an adult is one grain; of morphine,  $\frac{1}{8}$  to  $\frac{1}{4}$  grain. Codeine acts like morphine, but is weaker, and is less likely to be followed by headache, constipation, and other unpleasant symptoms. It is used principally to allay pain and coughs, "Codeine, paparenine, cryptopine, and narceine have a certain soporific action, but the remainder of the alkaloids are almost devoid of it."

*Official Preparations of Opium.*—The principal preparations (including the alkaloids) are the acetate, hydrochlorate, and sulphate of morphia, sulphate of codeia, powdered opium, pills of opium (opium and soap), Dover's powder (opium, ipecac, and sugar of milk), troches of licorice and opium, tincture of opium (laudanum), deodorized tincture (McMunn's elixir), camphorated tincture (paregoric), tincture of ipecac and opium (liquid Dover's powder), vinegar and wine of opium, and opium liniment. The use by the physician of one or other of these preparations is to a certain extent a matter of personal habit. The alkaloids are generally considered to act more promptly than opium itself and its solid and liquid preparations, and to be less constipating. Solutions of opium are more prompt in action than solid preparations and salts of morphine than morphine itself.

*Properties and Use of Opium.*—Opium is a stimulant narcotic; in small doses, stimulant; in larger, a sedative; and in still larger, a narcotic poison. It is readily absorbed from the stomach, less quickly from the rectum and vagina, and very little from the skin, if it is not abraded. When injected under the skin (subcutaneous, hypodermic, or hypodermatic use), its action, as a rule, is rapid. Opium is used by many nations for its exhilarating and anodyne influences, being either eaten, smoked, or used as a substitute for alcoholic drinks. Medically, it is used to relieve pain, to produce sleep in certain low conditions, to allay nervous irritation, as in

coughs, to check excessive secretion, as in diarrhoea, dysentery, and diabetes, and to support the system when sufficient food cannot be retained. The action of opium is not always uniform. With some individuals, due to age, race, temperament, condition of health, personal idiosyncrasies, etc., opium produces effects different from the ordinary results, such as delirium, cramps, vomiting, severe headache, and itching of the skin. Young children, old people, and persons of a nervous temperament are particularly susceptible to the influence of opium; small doses sometimes producing in these coma and even death. On the other hand, severe pain, flooding, etc., sometimes requires three to four times the ordinary dose. Many of the soothing syrups and carminatives contain opium. It is believed by many physicians that morphine should never be given to a child under 10, nor a hypodermic injection to a child under 15. In frogs small doses of opium produce tetanus; in mice, convulsions; they stupefy dogs and rabbits; while it requires large doses to poison ducks, chickens, and pigeons. In small doses, opium usually excites or stimulates, increasing the fulness, force, and frequency of the pulse, the temperature of the skin, the power of the muscles, arousing mental action, and affording bodily and mental calm. In a variable time, usually within an hour after the opiate has been taken, there is a disposition to sleep or repose. On arousing from sleep there is frequently headache, with nausea, tremors, etc., until the body recovers its energy. Most of the secretions are diminished by opium, the peristaltic action of the bowels lessened, pain and muscular contractions or spasms allayed, and nervous irritation relieved, but always with the risk of repetitions of the dose and the formation of the opium habit.

*Opium-Poisoning.*—This is quite frequent, due to the overuse of the drug to relieve pain or produce sleep, or as an indulgence, it being unfortunately too easy to procure opiates. Poisoning is principally from the salts of morphine, either used alone or in patented compounds. The primary or stimulant effects may be loquacity, restlessness, and hallucinations, although the period of exaltation may be short, if present at all, the symptoms of the second or intermediate period rapidly appearing. These are similar to those of congestion of the brain, weariness, dulness, drowsiness, a sense of weight in the extremities; the face is pale, suffused, or cyanotic; the pupils are slightly contracted; the breath is slow, and may be deep and stertorous; the skin may be dry and warm, or cool and wet; the pulse is generally normal; the patient is unconscious, but may be roused by shaking, by the infliction of pain, or by loud talking; and when aroused, his breathing becomes more rapid. In the third period, that of narcosis or coma, the patient cannot be aroused; the face is pale and cyanotic (bluish, especially the lips); the pupils are insensible to light, usually contracted to the size of a pinhead, sometimes dilated toward the end of life; the pulse is rapid and feeble; breathing is slow and shallow, with increasing intervals and sometimes is stertorous; the skin is bathed at first in warm perspiration, then becomes cold and clammy. Convulsions are rare. Recovery may even now take place, or death occurs from failure of

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respiration and arrest of the heart's action. A post-mortem examination may reveal nothing abnormal; or the brain may be congested, the vessels of the cerebro-spinal axis gorged with dark blood, the lungs, heart, liver, and spleen distended with dark fluid blood, and serum may fill the ventricles and be beneath the arachnoid.

**Treatment of Opium-Poisoning.**—Produce emesis, with copious drafts of warm water, with a tablespoonful of salt or a teaspoonful of mustard well stirred in; by tickling the throat with a feather; or by use of a stomach-pump; apply cold affusions to the head and spine, and flagellation to the palms, soles, and calves, and with a damp towel to the back; keep the patient walking briskly, though he begs for rest; give strong coffee and aromatic spirits of ammonia; frequently use the Faradaic current upon the limbs; and resort to artificial respiration if necessary.

**The Opium-Habit.**—Indispensable as opium is in certain affections, in the hands of the thoughtless and weak it is too often a curse. It is the most seductive of all the narcotics. "By its soothing and exhilarating influences it gains such a hold on the moral and physical nature that the strongest will be unable to emancipate the victim from its enchantment, and moral degradation results." With children, its frequent use in cough-mixtures, carminatives, etc., interferes with the assimilation of food, enervates the system, and prepares the way for depraved appetites. The opium-habit seems to be a disease of comparatively recent times, dating, as some believe, from the invention of the hypodermic syringe in 1848. Undoubtedly the consumption of opium has increased steadily within the last 50 years. This is due largely to the fact that neuroses have increased, owing partly to a more and more hurried and intense mode of living, and in part to the ease with which opiates are obtained and the attractive forms in which they are presented—granules, triturations, etc. The habit is often induced by the frequent use of opium to relieve pain or produce sleep, or is contracted simply through yielding to sensuous enjoyment, as in opium-smoking. It may also be due to defective will-power, transmitted sometimes in a neurotic taint from opium-taking parents and grandparents.

Victims of the opium-habit frequently become so demoralized as to need care in an asylum. They lie, steal, lose self-respect and ambition, are forgetful, may be subject to delusion, fear, and superstition, and are careless as to clothing and necessary habits, while still thinking highly of themselves. The great nerve-centres tolerate stimulation to a certain point. When the limit is reached, the time varying in different persons, the action of the various organs and tracts is disordered. The victim of opium suffers from imperfect digestion, faulty appetite and assimilation, and consequent malnutrition. The red blood corpuscles diminish, he is pale, has nausea, muscles are flabby, and endurance weakens. The kidneys become affected, the skin is congested, and when the disease is advanced, purpura appears. There is often a malaria-like fever. The functions of the testicles in the man and of the ovaries in the woman are suspended. Primarily there is functional derangement of the brain, then permanent deterioration. He becomes a slave to his

depraved appetite. When the time draws near for his allotted dose he is nervous, yawns, may have neuralgia, is weak, breaks out into a perspiration, and is miserable. He takes his dose, and is himself again; but after a time the dose has to be increased, and if relief from his craving is not obtained he sinks lower and lower and dies a wretched death. Two methods of cure are employed; one is the gradual reduction of opiates, the other is their sudden withdrawal—in either case giving in their stead bitter tonics, stimulant carminatives, such as ginger, and certain stimulants and medicines. The law holds opium habitués, as it does drunkards, responsible for crimes which they commit. Consult: 'United States Dispensatory and Reference Handbook of the Medical Sciences'; Potter, 'Handbook of Materia Medica, Pharmacy, and Therapeutics' (1901).

**Opium, Wild,** an American wild lettuce (*Lactuca canadensis*), noted for its tallness, reaching a height in some plants of ten feet.

**Opium Traffic, The.** The habitual use of opium as a narcotic drug is common in most countries, and particularly so in China, India, Turkey, the Philippines and the Malay Archipelago. The great source whence China has always derived its opium has been India, where, since 1793, the drug has been a government monopoly, the cultivators, in Behar, Benares, and Malwa being paid at a fixed rate for their crops for exportation to China. The trade was contraband, the Chinese government having in 1796 prohibited the importation of opium. Through the connivance of the Chinese local officials, the importation about trebled in the 20 years between 1816 and 1836. In March 1839 the Chinese authorities forbade all foreigners to quit Canton, and ordered them to deliver up the opium in their possession, which was destroyed. War with Great Britain resulted, which ended in the defeat of the Chinese, who were obliged to pay indemnity for the opium. They have since been compelled to admit it, and the Indian revenue derivable from its growth has risen to about \$45,000,000 annually. The imports of opium into Great Britain average 600,000 to 700,000 pounds annually. This is chiefly re-exported—about 140,000 pounds to the United States, and over 200,000 pounds to South America and the West Indies. The United States imports nearly 600,000 pounds of crude opium, and from 45,000 to 75,000 pounds of opium prepared for smoking.

Opium in Asiatic countries is chiefly smoked and not eaten, a special pipe and lamp being employed. Before it is suited for smoking it goes through several processes, which bring it into the form of a blackish paste. The pipe, or rather the stem of the pipe, is made of heavy wood, and is about the length and size of an ordinary flute; the bowl is generally made of earthenware. The smoker, who is reclining, takes a small portion of opium about the size of a pea on the end of a spoon-headed needle, heats it at the lamp, and then places it in the bowl of the pipe, the pellet of opium having previously been perforated with the needle. He then brings the opium to the flame of the lamp, inhales the smoke in several inspirations, and is then ready to repeat the process with a fresh quantity of opium. The smoke is exhaled through the nostrils. Old smokers are able to

fill the lungs with it. The smell of the burning opium is rather sickening to those unaccustomed to it.

In China probably about 1 per cent of the entire population smoke opium, but the habit is growing rapidly. Fines, penalties, and even death have been found ineffective to stop the practice. The Japanese government has always steadfastly opposed opium. In Formosa, since that island has become Japanese territory, the Japanese have restricted, and hope eventually to abolish, opium smoking. By a local law of the church, all Roman Catholics in China are forbidden to engage in the cultivation, sale, or smoking of opium. It is universally recognized as a great evil throughout China, the stress being most severe upon the laboring classes, who spend on the drug a large portion of their earnings, and so bring ruin on themselves and their families, too little income being left for food or clothing. Among the richer classes the habit diminishes energy and lowers the moral tone.

The habitual consumption of opium other than smoking, is known as opium-eating, the opium habit, morphine habit, or morphinism. Opium, laudanum, chlorodyne, black drop, nepenthe, morphine, and other forms are all used. They are most commonly taken by the mouth and by the subcutaneous injection of morphine. The habit is usually begun to relieve pain or sleeplessness, and one month's constant use of the drug is said to be sufficient in many cases to confirm the habit. The amount consumed by different individuals varies greatly. Of morphine most habitués take about three grains daily, some five or six grains, while a few go much higher. De Quincey says that at one time of his life he consumed 8,000 drops of laudanum daily, but his ration was very excessive.

In the Philippines the opium traffic, which is a deep-rooted evil, is a question of prohibition versus some form of license. A measure proposed by the United States government for the regulation of the traffic was suppressed in consequence of a vigorous outcry raised in the States against the legalization of the traffic in the drug, and against any form of governmental participation in the profits realized from its sale. Under the law of Spain in force in the Philippine Islands for years before the American occupancy, the Filipinos were forbidden to smoke or use opium, and all dealers in opium were forbidden to sell the drug to the Filipinos or to permit it to be used on their premises by Filipinos. The Spanish system provided for the sale of the privilege of selling opium to Chinamen in each province to an opium farmer or contractor. It provided that opium should only be used or smoked in certain places, which were under the surveillance of the police, and if a Filipino was found in such resorts he was arrested and the owner of the resort was subjected to punishment. This was the system at the time of the American occupation. The Spaniards recognized the habitual use of the drug by Chinamen and the futility of attempting its prohibition, surrounded it with laws which kept it under governmental control, and virtually prevented its use by Filipinos, who showed no disposition to acquire the habit. These laws were not continued by the American authorities, and for nearly five years the only checks upon the sale and use of the drug was a duty imposed

in the custom-house and a provision in the municipal code requiring municipal councils to pass ordinances punishing the keepers of dives in their respective towns. The result of this system is shown by the imports of opium:

	Pounds
1900.....	224,115
1901.....	369,037
1902.....	137,583
1903.....	212,143
1904.....	142,813
1905.....	159,380
1906.....	138,649
1907.....	163,278
1908.....	147,021
1909.....	93,053

In the United States there are said to be over 1,000,000 persons who are habitual users of opium. In all the larger cities opium dens are to be found, while in San Francisco and New York, the habit has become an alarming public evil. It is used, too, in pill form, in nearly every prison and penitentiary in America. In one prison among a population of 1,600 convicts, over 1,200 are habitual users of the drug in the form of pills, which are prepared outside of the prison walls and smuggled to the prisoners. In this instance the market price of an opium pill varies from 10 cents to \$5, according to the supply of smuggled pills inside the prison walls. The evil has grown rapidly, and apparently no effort has been made to abolish or control the traffic. Upward of 300 persons are engaged in the business of opium smuggling on the Pacific coast and along the Canadian border, and it is estimated that opium to the value of \$2,000,000 is annually smuggled into the United States.

**Opodel'doc**, a medicinal plaster, said to have been invented by Mindererus, and used for external injuries. The name is now applied to a liniment which is much used as an anodyne application in sprains, bruises, and rheumatic pains. It is prepared by dissolving 3 ounces of common soap in a pint of alcohol by the heat of a sand bath, then adding an ounce of camphor, and a fluid dram each of oil of rosemary and oil of origanum. It concretes into a soft, translucent, yellowish white mass, of the consistency of soft ointment; but it becomes liquid when rubbed upon the skin.

**Opon**, ô'pôn, Philippines, a pueblo of the province of Cebu, situated on the northwestern shore of Mactán Island, three miles across the channel from the town of Cebu. In 1521 Magellan was killed here in a conflict with the natives. Pop. 11,506.

**Opop'anax**, a gum resin with a peculiar acrid odor, the produce of an umbelliferous plant, *Opopanax chirorium*. This plant is a native of southern Europe and Asia Minor, and the granular gum is brought to market from the Levant. The physicians of ancient times highly esteemed it for its purifying and aperient virtues, and it still continues a famous medicine in the East, where it is looked upon as a cure for all diseases.

The perfume known as opopanax is not derived from this gum-resin. There is a commercial opopanax, a kind of perfumed myrrh, obtained from a *Balsamodendron*, largely imported into Germany, where an essential oil is distilled from it.

**Oporto**, ô-pôr'tô (Port. oo-poor'too), Portugal, a large city and seaport, capital of the



province of the same name, on a steep declivity on the right bank of the Douro, about 2 miles from its mouth, and 170 miles north of Lisbon. The river is crossed by a bold and striking railway bridge, and a high and low level bridge for tramways and foot passengers. The houses rise one above another in terraces, and there are well-built quarters with broad and straight streets, public gardens, promenades, and other attractive features. The chief buildings comprise the Gothic cathedral, and some interesting churches; the bishop's palace, the exchange, the town-house, the custom-house, the English club, the great hospital, the opera-house, theatre, crystal palace, etc. One of the most striking architectural objects is the Torre dos Clerigos (Tower of the Clergy), attached to the church of same name. The principal trade of Oporto is in wine, white and red, but chiefly the latter, much of which is sent to Great Britain, and derives its name *port* from this city. There are manufactories of excellent cottons, silks, woolen and linen stuffs, pottery, lace, buttons, gold and silver wire, glass, leather, etc. Royal tobacco and soap works, iron-foundries and sugar-refineries are also in operation. In ancient times the site of Oporto was occupied by the harbor town Portus Cale afterward Porto Cale, from which the name of the kingdom, Portugal, is derived. Oporto was capital of Portugal till 1174, when the seat of government was transferred to Lisbon. It was taken and sacked by the French in 1805, who retained possession of it till 1809, when the British crossed the Douro and compelled them to retire. Having sided with Dom Pedro, it was besieged in 1831-2 above a year by the troops of Dom Miguel, when much of it was destroyed, and its trade was for the time annihilated.

**Opos'sum**, the name, adopted from the Indian name of the northern species, for the family of American marsupial mammals *Didelphidae*, more particularly for the typical genus *Didelphys*, and specifically for *D. virginiana* of the United States. The place of this family in the order is among the higher polyprotodonts associated with the dasyures and bandicoots (*Perameles*); and their greatest peculiarity lies in the fact that, with a single exception, this group contains all the marsupials existing outside of Australasia; while the family itself is not represented there, for various marsupials carelessly called "opossums" in Australia are not members of this family, which is confined to America, and mainly to its tropical parts, where doubtless it is a survivor from the Mesozoic Age when marsupials were generally distributed over the whole world. The opossums are arboreal omnivorous animals, ranging in size from that of a cat to that of a mouse. They have 50 teeth, having 10 incisors in the upper jaw, and eight in the lower, one canine tooth on each side in each jaw, three compressed premolars, and four sharply-tuberculated molars on each side. The head is long, muzzle pointed, ears large and naked. The fur is long, loose and grizzled. The tail is long, prehensile, and in part scaly. The feet are plantigrade, with five toes on each foot, their claws long and sharp; but the inner toe of the right foot converted into a thumb, destitute of a claw, and opposable to the other digits. The pouch, so characteristic of marsupials, is absent in the familiar northern

and most other species, the nipples opening between folds of skin which represent a marsupium. To these the minute young are attached by the mother as soon as born, which is after only about 26 days of embryonic life, and when still in a very undeveloped condition; and there they cling five or six weeks until able to run about. The young are numerous and remain with the mother until well grown, clinging to her fur and being carried about as she scrambles among the branches, with their tails tightly wound about hers, or about her limbs or neck. Their prehensile rope-like tails are of vast service to these animals, enabling them to use all four feet in food-gathering while suspended by this useful fifth member.

In habits the opossums generally are nocturnal. The food consists chiefly of insects, small mammals, and birds; most species are fond of fruits; and the Brazilian crab-eating opossum (*D. cancrivora*) obtains its name from its partiality for the flesh of crabs, which the northern species will also eat, as well as frogs, when other food is scarce. They are preeminently arboreal animals, and make their homes in hollows of trees, bedded with leaves and soft grass; here the days are spent in drowsy hiding, and the young are brought forth in early summer. Owls frequently share these hollows with the opossums. On the ground the movements of the opossums are slow and awkward. They get credit for being exceedingly cunning animals, and are famous for their skill, and patient endurance of indignities and even torture, in counterfeiting death when threatened with harm. "Playing 'possum" has passed into a proverbial expression to indicate any deceitful procedure. Some observers declare that this supposed counterfeit of death is solely the paralyzing effect of fear, but this simple explanation is not generally regarded as wholly adequate to account for the phenomenon.

The number of species in this family is undetermined, but more than 20 have been named, mainly small animals of South America. The most remarkable form, perhaps, is the tiny reddish "mouse-opossum" (*D. murina*) of Mexico and southward, which is no larger than a field-mouse. Other species are shrew-like. Of a different genus is the curious yapok (*Cheironectes variegatus*), found from Guatemala to Paraguay, which has the hind-feet webbed. It swims and dives with great ease, gathering from the water its food, consisting of fishes and crustaceans. It inhabits holes in the banks of rivers, and is strongly marked with brown bands on a gray ground. Several of the tropical species are more strongly colored than the northern opossum, which is simply whitish gray.

The flesh of all the larger species is eaten, and that of the Virginia opossum is regarded as one of the woodland delicacies of the Southern States. Hunting the opossum with dogs at night is a favorite sport in the South, especially in autumn, when the body has a thick layer of fat all over. The animal takes refuge in a tree, and is either shaken down or shot as it hangs by the tail. The flesh is usually baked and eaten with roasted sweet potatoes.

Consult writers upon American mammals, as Audubon and Bachman, Goodman, Allen, Merriam, C. C. Abbott, D. L. Sharp, etc. For the family generally consult: Beddard, 'Mammalia' (1902); Alston, 'Biologia Centrali

## OPOSSUM-MOUSE—OPTICAL PHENOMENA

'Americana' (1874); Goeldi, 'Proceedings' of the Zoological Society of London, 1894, p. 457.

**Opossum-mouse**, one of the diminutive, active, very mouse-like phalangers of the genus *Acrobates*.

**Opossum-rat**, a book-name, translated from the local name "*raton runcho*," in Ecuador, of a rare little marsupial inhabiting the northern Andean region, which is of special interest because it represents in America an entirely different branch (the diprotodont) of marsupials from the marsupials, and is the sole survivor of an extinct family (*Epanorthida*) formerly prevalent in Patagonia. It looks like an opossum of the size of a rat, lives in high brush-wood, feeds mainly on birds and their eggs, and specimens are obtained rarely and with difficulty. It was first described in the 'Proceedings' of the Zoological Society of London for 1860, by R. F. Toms, in working out a collection of small mammals obtained by Louis Fraser in Ecuador, published the first notice of *Cænolestes*, which he described under the name *Hyracodon fuliginosus*. Oldfield Thomas, F. Z. G., rediscovered Toms' genus in a specimen obtained near Bogotá. This specimen Thomas found it necessary to consider as representing a new species. The name *Hyracodon* having been found to be preoccupied, Thomas suggested *Cænolestes*, calling his specimen *obscurus* and Toms' *fuliginosus*. Consult Thomas, 'Proceedings' Zoological Society of London for 1895, p. 870.

**Opossum-shrimp**, a small, shrimp-like marine crustacean of the order *Schizopoda*, so called because of the egg-carrying pouches between the thoracic legs of the female. See CRUSTACEA.

**Oppenheim**, öp'ën-him, E. Phillips, English novelist. He was educated at Leicester, England, and among his published works, several of which have had many readers in this country, are: 'Enoch Strone'; 'A Man and his Kingdom'; 'A Millionaire of Yesterday'; 'The Survivor'; 'The World's Great Snare.'

**Oppenheim**, Nathan, American physician: b. Albany, N. Y., 17 Oct. 1863. A graduate of Harvard (1888), and of the College of Physicians and Surgeons (1891), he has made a specialty of the diseases of children. He has published in that field: 'The Development of the Child' (1899); 'The Medical Diseases of Childhood' (1900); 'The Care of the Child in Health' (1901); 'Mental Growth and Conditions of Children' (1902).

**Op'per**, Frederick Burr, American illustrator: b. Madison, Ohio, 2 Jan. 1857. He left school at 14, worked in a newspaper office and then in a store in New York, soon succeeding in getting his humorous sketches published. He was employed upon the Frank Leslie publications three years, and was associated with Puck 1880-99. In the last named year he joined the staff of the New York *Journal*. He has published several of his series of humorous drawings in book form.

**Oppert**, öp'pért (Fr. ö-pär), Jules, French Orientalist: b. Hamburg, Germany, 9 July 1825; d. Paris, France, 21 Aug. 1905. He was educated for the law at Heidelberg, but abandoned that calling to study Oriental languages at Bonn

and Berlin. His first literary work, 'Das Lautsystem des Altpersischen,' was published in 1847, and in 1848 he accepted a professorship at the Lyceum of Laval. In 1857 he was professor of Sanskrit at the schools of the National Library, and in 1874 took the chair of Assyriology in the Collège de France, receiving election to the Académie des Inscriptions in 1881. He published: 'Les Inscriptions des Achéménides' (1852); 'Grande Inscription du Palé', de Khorsabad' (1863); 'Le Peuple et la Langue des Mèdes' (1879); 'Etudes sumériennes' (1881); 'Le Calendrier perse' (1899); etc.

**Oppian**, öp'i-an, Greek poet: b. (at Korylus or Anazarbus in Cilicia) in the 2d century A.D. He wrote a didactic poem of five books on Fishing (*Halieutica*) in lively but often tumid diction, and with correct and polished versification. Another poem on Hunting (*Cynegetica*) has been falsely attributed to him; but the diction is rough and the verse halting, and the work is no doubt the production of a writer of the time of Caracalla, 3d century A.D. Consult: Miller, 'Oppians des Jüngern Gedicht von der Jagd' (1885).

**Opposition**, (1) in politics, the party who, under a constitutional government, are opposed to the existing administration, and who would probably come into power on its displacement. A fair and temperate opposition is a wholesome check upon the party in power, as it is for its interest to demonstrate the injustice, impracticability, or insufficiency of the laws or proceedings of the government; but, on the other hand, the despatch of public business may be seriously delayed by the conduct of a factious or obstructive opposition. (2) In astronomy, the situation of two heavenly bodies when they are diametrically opposed to each other, or when their longitudes differ by 180°. Thus there is always an opposition of sun and moon at every full moon; also the moon, or a planet, is said to be in opposition to the sun when it passes the meridian at midnight. Signified by the symbol of the opposition of Jupiter to the sun. (3) In logic, opposition of judgments is the relation between any two which have the same matter, but a different form, the same subject and predicate, but a different quantity, quality or relation. There are five kinds of opposition, namely, contradictory, contrary, inconsistent, subaltern, and subcontrary.

**Ops**, Roman female divinity of plenty and fertility. She was supposed to make her abode on the earth as the protectress of agriculture, and was worshipped usually in the temple of Saturn, whose wife she was believed to be. Newly born children were especially recommended to her care, and her festivals were called Opalia and Opiconsivia.

**Op'tic**, Oliver. See ADAMS, WILLIAM TAYLOR.

**Optic Axis**. See LIGHT.

**Optic Nerve**. See EYE.

**Optical Illusion**. See ILLUSION.

**Optical Images**. See LIGHT.

**Optical Phenomena of the Atmosphere**. See LIGHT.

**Optics.** See **LIGHT**.

**Op'timism** (Lat. *optimus*, best), the opinion that this world, physically, socially, and morally, is the best that could possibly exist. It is opposed to pessimism (Lat. *pessimus*, worst), the opinion that this is the worst possible world. The optimist looks upon existence as a great and unmixed good. Some advocates of optimism have maintained that while the Author of all things was not compelled to produce the best and happiest order of things, he has in fact actually done so, because the presence of evil teaches mankind to discern and choose the good, by striving through suffering and self-exertion to attain the blessedness which is within the reach of all alike. Other optimists reason *a priori* that it is impossible that God could produce anything that was not the best; that in spite of evil and suffering, it harmonizes with the idea of His perfect goodness to infer that the motive for the creation of man is stronger than that for non-creation, in that life affords means of enjoyment which are unquestionable and give the opportunity and capability of attaining perfection.

The controversy between optimism and pessimism is as old as the beginning of philosophy. In the East it engaged the followers of Zoroaster, the Gnostics, and the Manichæan speculators. The disciples of Thales and his school, of Parmenides and the Eleatics discussed the question; Democritus was an optimist, Heraclitus a pessimist; the Stoic, the Peripatetic, and the Platonist joined in the controversy.

There was a great deal of optimism in Aristotle, and Socrates was a pronounced optimist. The discussion as to the preponderance of good or evil in the world and their admixture was maintained by the fathers of the Church and by the schoolmen. In modern philosophy optimism was advocated by Descartes, Malebranche, and Spinoza, but the full development of the theory was left to Leibnitz (q.v.), who in his 'Theodicee' elaborately expounds the thesis that the present world is the best possible creation, and the most perfect that omnipotence would produce. In recent times optimistic theory has been associated almost entirely with the ideas of improvement and progress (q.v.). See **PESSIMISM**; **SCHOPENHAUER**.

**Opun'tia.** See **PRICKLY PEAR**.

**Oquas'sa, or Quasky, Trout.** See **TROUT**.

**Or'ach, or Orache, a weed.** See **GOOSE-FOOT**.

**Or'acles**, responses believed to be given by a deity to a worshipper or inquirer. We read of ancient Egyptian oracular shrines or oracles, but by far the most celebrated were those of Greece. The oracle at Dodona, in Epirus, the oldest in Greece, appears to have originally belonged to the Pelasgians. Everything points to a native origin, but at a later period Egyptian influence produced important changes, notably the substitution of priestesses for the earlier male interpreters known as Selli. At this oracle Zeus himself was supposed to speak to men through the rustling of the leaves of a lofty oak, but other forms of divination were introduced from time to time, such as the

striking of metal basins; and from Plato we learn that in his time the priestesses, following the example of those at Delphi, made their pronouncements in a state of religious frenzy. Dori-machus, an Ætolian general, razed the temple of Zeus here to the ground in 219 a.c., and the oracle appears never to have recovered from the blow. Not so old, but far more important, was the oracle of Apollo at Delphi, in Phocis, where the oracular declarations were made during a period of frenzy by the Pythian priestess seated on a tripod over a chasm from which a peculiar exhalation was supposed to issue. This was the chief national oracle of the whole Hellenic race, and its influence on Greek history must have been considerable. It was sometimes consulted also by foreigners, and attained the zenith of its power in the 6th century a.c. From the time of Alexander the Great its influence was of little account. Other noteworthy oracles of Apollo were those at Abæ in Phocis, at Thebes in Bœotia, at Hysia in Bœotia, at Claros in Miletus, at Gryneia in the Æolian territory of Asia Minor, at Argos, and at Delos. Oracles of other gods, such as Dionysus, Hermes, and Pan, are mentioned, and there were also oracles of heroes such as Asclepius, Heracles, Trophonius (a famous one at Lebadea, in Bœotia), Tiresias, Amphiaraus, Mopsus, and Colchus. The spirits of the dead were supposed to utter oracular sayings in certain places, especially near Lake Aornos among the Threpsians and at Tænarus in the south of Laconia. In Italy the only oracles in the strict sense of the term were the temples of Fortune at Præneste and Antium. The oracles were consulted at the outset of every great undertaking, such as the founding of a city or colony, the declaring of war, or the conclusion of peace; but their responses were generally expressed in more or less ambiguous language. Consult: Bouché-Leclercq, 'Histoire de la Divination dans L'Antiquité' (1879-82); Schneider, 'Die Divinationen der Alten mit besonderer Rücksicht auf die Augurien der Römer' (1862); König, 'Das Orakelwesen im Alterthum' (1877).

**Oran, ô-rân'** (Fr. ô-rôn), Algeria, (1) a town, capital of the department and on a bay of the same name in the Mediterranean, 209 miles by rail southwest of Algiers. It rises in the form of an amphitheatre, on the side of Mount Murdjadjo, has quite the appearance of a French town, and is mostly modern. It is strongly fortified by works of recent construction. Among the buildings may be mentioned the cathedral, the grand mosque, the citadel or castle, the Kasbah or old citadel, and the large military hospital. There are two harbors, an old or inner, 10 acres in area, and a new or outer of 60 acres area. The principal articles of export are esparto grass, cereals, wine, olives, tobacco, hides, and skins, etc. Considerable quantities of cigarettes are made and exported. Pop. about 90,000, of whom three fourths are Europeans, about 25,000 being French and 34,000 Spanish. The town was built by the Moors. It was captured by the Spaniards in 1509, by the Turks in 1708, and again by the Spaniards in 1732. It was destroyed by an earthquake in 1791, and shortly after abandoned by the Spaniards. In 1831 it came into the possession of the French, and has









ORANG-UTAN (*Simia satyrus*).





## ORANG-UTAN — ORANGE

been developed by them into a large and prosperous town. (2) The department, forming a long belt along the Mediterranean, bounded on the east by the province of Algiers, south by the Sahara, and west by Morocco, has an area of 44,616 square miles, and a population (1901) of 1,103,108.

**Orang'-utan**, the Malay name, signifying "man of the woods," of the large anthropoid ape (q.v.) of Borneo and Sumatra. The orang belongs to the typical genus *Simia* of the family *Simiidae*, and there is probably but one species (*S. satyrus*), though some naturalists believe otherwise. The face and skull of the young are very human, but in the adult the jaws become protruding and the crown elevated. The body is short and massive, the legs short and bowed, and the arms and hands disproportionately long, reaching to the ankle, but the thumb is very short. Except the face, hands, and feet, the body is thickly clothed with coarse, reddish-brown hair, which is especially long on the arms, where it converges to the elbow, the thighs, and the beard of the male. There are no ischial callosities, and no tail. Cheek-pouches are absent, but old males have the face much broadened by the development of prominent fibrous warty protuberances, and in this sex the canine teeth become much enlarged. In some respects this ape approaches man more closely than any other existing species, but in others it differs widely and resembles the lower apes. In size it is much inferior to the gorilla of equatorial Africa, seldom exceeding four feet in height, and it lacks the high sagittal crest, and particularly the prominent superciliary ridges, which give to the males of that species so ferocious an aspect. At the present time the orang is confined to the deep swampy forests of Borneo and Sumatra. It is arboreal in habit, and builds nests of boughs and leaves among the branches of the trees. For this mode of life its structure is eminently adapted, its long arms, crooked legs, and great strength enabling it to travel through the tree-tops with the greatest facility. To an equal degree these structures ill adapt it to terrestrial locomotion. It does not stand erect, as often represented, except now and then for a short time, and when supported, but in a semi-erect attitude, resting on the side of the inturned feet and on the knuckles of the hands, which, as a consequence, develop callosities. The orang lives exclusively upon a vegetable diet, consisting chiefly of fruits. The males especially have powerful voices, made possible by the great development of the larynx. Naturally they are sluggish and sullen, but the disposition is mild. Stories of their great ferocity, and particularly of their habit of lying concealed in the branches of trees above pathways, from which they reach down a foot to grasp men by the throat, are pure fables. In confinement one of their most interesting characteristics is their teachability and the changing expression of the face resulting from the great mobility of the lips. Consult: Hartmann, 'Anthropoid Apes' (1886), in which many other authorities are given; Forbes, 'Allen's Natural History,' Vol. I. (1897); and the books of Wallace, Forbes, Hornaday, and other scientific travelers in the Malayan region.

**Orange, ór'énj**, Prince of. See **WILLIAM THE SILENT**, PRINCE OF ORANGE; **WILLIAM III.**, KING OF ENGLAND; **MAURICE OF NASSAU**.

**Orange**, Mass., town, Franklin County, on Miller's River and on the Fitchburg railroad; 37 miles north-northeast of Springfield. The town includes the villages of Orange, North Orange, and Tully. The town was incorporated in 1810. The surface is very uneven, the village of Orange being built on a hill that rises abruptly from the river. Orange is one of the most enterprising manufacturing towns of the county; the manufactures include sewing machines, motor-carriages, water wheels, and other machinery, furniture, boxes, shoes, and vests. It has three handsome parks and a public library. Pop. of town (1890) 4,568; (1900) 5,520; (1910) 5,282.

**Orange**, N. J., city in Essex County, on the Delaware & L. and the Erie R.R.'s; about four miles west by north of Newark. It has electric railroad connections with Newark, Jersey City, East Orange, South Orange, Bloomfield, Montclair, and other cities and towns in the vicinity. Orange was settled about 1666 by a colony from Connecticut. At first it was a part of Newark and was called "Newark Mountain." The residents of "Newark Mountain," in 1718, established a separate church, and the organization was known as "The Mountain Society." This same church was known in 1781 as the "Second Church of Newark," and now (1904) as the "First Presbyterian Church of Orange." In 1790 a further separation took place, and the place was called Orange Dale. In 1806 Orange became a separate town, incorporated under the name of Orange. Other divisions were made, and South, West, and East Orange were established in the years 1861, 1862, and 1863, respectively.

Orange is on an elevation, the lower slope of Watchung Mountain, a ridge extending northeast and southwest, rising in some places 650 feet above tidewater. Adjoining the city or in the near vicinity are Hemlock Falls, in South Orange; Llewellyn Park, which contains 750 acres, and many fine residences, West Orange. Eagle Rock, an eastern crest of the mountain, is now within the limits of the Essex County Park System. The city and vicinity have miles and miles of good roads, many shade trees, and long lines of well-kept hedges. Orange and all the "Oranges" are residential sections for New York business men, many of whom have their homes here, while others remain only during the summer months. The city has considerable manufacturing interests. The chief manufacturing establishments are hat factories, for which Orange is noted, printing plants, and the Edison laboratory near Llewellyn Park. The number of employees in the manufactories is about 5,000. The city has an extensive trade in hats and considerable trade in other manufactures and fruit. Some of the prominent buildings are the Metropolitan building, Music Hall, Masonic Temple, Decker building, the "First Presbyterian Church," already mentioned, the original still standing, but several times remodeled, and the church, school, and library buildings. It has a House of the Good Shepherd, an orphanage, and the Orange Memorial Hospital. The educational institutions are pub-

## ORANGE—ORANGE AND ORANGE CULTURE

lic and parish schools, the Stickler Memorial library, a city library, the Orange Training School for Nurses, and at South Orange, Seton Hall College, a Roman Catholic institution for boys and men. The Locke College for Boys, and other private schools are in the "Oranges." There are 20 churches representing a number of denominations. The city has a number of organizations whose objects are educational and charitable, as the Mendelssohn Union, a Bureau of Associated Charities, a New England Society, and several literary societies. It has also a number of athletic and social clubs. The three banks have a combined capital of \$450,000. The government, administered under a revised charter of 1879, is vested in a mayor and council, who appoint or elect the administrative officials, except the board of education, which is chosen by popular vote. The city owns and operates the waterworks. Pop. (1900) 24,141; (1910) 29,630. Consult: Wickes, 'History of the Oranges from 1666 to 1806' (1892); Whittemore, 'The Founders and Builders of the Oranges' (1896).

**Orange, Texas**, city, county-seat of Orange County; on the Sabine River, at the head of navigation, and on the Southern Pacific railroad; 85 miles northeast of Galveston. It is the shipping centre for the surrounding region, exporting rice, cotton, oranges, and live stock. It has several large lumber mills, shingle and saw mills, and also cotton gins and a rice mill. The public schools include a high school for the colored race. The city owns and operates the waterworks. Pop. (1910) 5,527.

**Orange, Fort**, a former fort built in 1623, on the site of the present city of Albany, N. Y. It was erected by the Dutch as a defense work against the Indians.

**Orange City, Iowa**, town, county-seat of Sioux County; on the Chicago & Northwestern railroad; 40 miles north-northeast of Sioux City. It is in an agricultural and hog-raising district. Its most notable public building is the county court-house. It is the seat of the Northwestern Classical Academy (coeducational), founded in 1882 under the auspices of the Reformed Church. Pop. (1910) 1,374.

**Orange Free State.** See ORANGE RIVER COLONY.

**Orange and Orange Culture**, various species of the genus *Citrus* (order Rutaceæ), and their fruits. The most important species is *C. aurantium*, which is the parent of most of the commercial varieties. It is a small, branching, long-lived tree or shrub, with oval or elliptical evergreen indistinctly compound leaves, and very fragrant white flowers. The fruits are globular or elliptical, and vary considerable in size. Botanically considered they are berries divided into eight or ten cells, filled with a juicy and more or less acid pulp. The tough, yellow rind is valued, especially in some varieties, for its oil, which is extracted for use in flavoring and in perfumery. The flowers also are employed in decoration and worn as a significant ornament, especially by the bride at her wedding. But it is as a dessert fruit, and for the manufacture of preserves, marmalade, etc., that the orange is of chief importance. For these purposes the tree has been taken from its native

home in southeastern Asia to all tropical and sub-tropical climates in the civilized world, and is cultivated extensively in many places not only to supply the local demands, but for the shipment of its fruits to climates beyond its range of cultivation. In the United States the two important commercial regions of orange growing are Florida and southern California. In the former the region of successful cultivation has been restricted by experience of killing frosts to the southern counties, although previous to 1895 the orange-growing region extended over most of the peninsular parts of the State. In many places the trees were growing wild when the State was settled, and it is surmised that these trees were the progeny of specimens introduced by the Spaniards in the early days. A third region is the delta of the Mississippi River. Parts of Texas, Arizona, and New Mexico are promising.

The species mentioned above has developed several well-marked botanical varieties, each of which has more or less horticultural sorts. The most important botanical variety is *sinensis*, which is the immediate parent of the common sweet orange, and the Portugal or Malta orange. In the United States about 70 of the numerous varieties are cultivated. They are characterized by usually round fruits, which are generally sweet or slightly acid, and have a sweet aromatic skin highly valued in cookery for flavoring. Its juice makes a superior wine. To this group belong the famous Bahia or navel varieties, which are extensively cultivated in California, and usually are seedless. The initial trees, originally native to Brazil, were introduced in 1870 by William Saunders of the United States Department of Agriculture at Washington, and distributed by him throughout the orange-growing sections of the country. It is, therefore, often called the Washington navel. Its peculiar formation is due to the development of a secondary axis with more or less cells in the centre of the fruit.

The bitter, sour, or Seville orange (variety *amara*), is so named from its pulp. Few of its horticultural varieties are cultivated in the United States, except as a stock upon which to bud varieties of sweet orange, lemon, and pomelo,—a use for which they seem especially well fitted. The flowers, immature fruits, and young twigs of this variety are extensively employed in the manufacture of an ethereal oil, and the skin of the ripe fruit in making Bigaradia oil. In southern France the flowers are widely used for making perfumery. The Bergamot orange (variety *bergamia*) is a small tree or shrub rarely seen in the United States, but cultivated in Europe for more than 200 years. The rind of the fruit furnishes Bergamot oil. The mandarin or tangerine orange (variety *nobilis*) is a very small tree or a shrub with dense foliage and small fruits most noted for the looseness of the skin which is barely attached to the pulp. Because of easy removal of the pulp it has received its commonest name—kid-glove orange. Its varieties are gaining in popularity in the United States. The Otaheite orange (variety *otaitense*) is considered by some botanists as a variety of the common sweet orange. Others think it may be a hybrid between the lemon and the orange. It is a very popular pot-plant in greenhouses, on account of its



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## ORANGE AND ORANGE-CULTURE

diminutive size, free blooming and fruiting qualities.

The only other important species of orange is the three-leaved or trifoliate orange (*C. trifoliata*). This is a small, thorny Japanese tree, whose chief use is as a hedge-plant. It is hardy as far north as New York, and is popular southward. Its small, yellow, downy juiceless, bitter, sour fruits are sometimes used in preserves. The plant is also valued as a stock upon which to bud various citrous fruits, especially the kumquat (kin-kin, or kin-kits, *C. japonica*) and the satsuma orange, a variety of mandarin orange. It is said to make the more tender varieties somewhat hardier, and to reduce the size of the larger growing sorts. It seems to be a promising species for hybridizing with other kinds; a large number of hybrid varieties have been produced, but are not cultivated except experimentally. The osage orange (*Toxylon pomiferum*, better known as *Maclura aurantiaca*) is a member of the natural order *Urticaceæ*. It is therefore not properly an orange at all. (See OSAGE ORANGE.)

The orange was formerly propagated almost wholly by means of seeds, but since the sweet orange varieties so produced seemed to be seriously affected with root-disease ("foot-rot") and were variable both in habit of growth and value of fruit, propagation by means of buds has very largely replaced the more primitive methods. The stocks preferred are the Seville and trifoliate orange and the so-called "rough lemon," apparently a natural hybrid, which resembles the lemon in foliage and flower, but whose fruit looks like the sour orange, being large, round, and distinctly acid. These stocks are grown from seed, and when the seedlings are of suitable size they are budded with the desired variety. After growing in the nursery for a year, after being budded, the trees may be set in the orchard. The distances usually chosen vary between 25 and 30 feet, but varieties upon *Trifoliata* stock may be set closer together. When transplanted the tops are rather severely cut back so as to balance the loss of root in digging; and to check evaporation the ground is frequently covered with a mulch of straw, pine needles or other loose material. Clean cultivation is also given from the time the orchard is set, at least during the growing and dry season, followed by the sowing of some cover-crop, which will enrich the soil. This crop may be cut for hay, but its equivalent in such cases should be returned to the land in the form of fertilizer and humus. Fertilizers should be applied liberally because the orange is a gross feeder.

As to soil, the orange thrives upon a great variety of land, profitable orchards being found upon the sandy hammock lands of Florida, the alluvial soils of the Mississippi delta, and the red mineral soils of California. Always, however, these lands must be well drained, in respect to both water and air. Indeed, injuries in California are not infrequently due to the settling of cold air in badly located orange orchards, or orchards from which there is inadequate air-drainage at critical seasons. In Florida and the Mississippi delta frost injuries are due to the influx of immense volumes of frigid air brought by continental cyclones or blizzards. To protect the trees in these regions against frost, vari-

ous expedients have been tried. In the delta the trees are banked with earth to protect the trunks. In this case the branches may or may not be injured; where they are, the trunks are relied upon to send out new sprouts. These will renew the plantation in a few years. In Florida the groves are often shielded with high board fences on the side of the expected storm; they may also be covered with canvas or slats. Sometimes these enclosures are warmed during severe weather by means of fires, frequently in improvised stoves. At Deland, Fla., more than 30 acres of orange trees are kept under cover.

Orange trees continue to bear, with reasonable care and under favorable conditions, for many years, reaching profitable age in some cases when less than six years old. The trees bear more or less continuously, flowers and fruits in all stages of development being found upon the same tree throughout the year. The great mass of the fruit, however, becomes ripe at one time. When ready for harvest, the individual fruits are cut off with scissors, not pulled from the trees. They are then allowed to stand for a few days to dry and soften somewhat before being graded and boxed for shipment. Each fruit is wrapped in tissue paper before being packed. The standard orange-box contains two cubic feet and usually holds about 200 oranges. Large specimens occasionally reduce the number below 100, and small ones increase it to more than 250. When properly managed both before packing and during shipment the fruits should keep for several months.

Among the difficulties in orange growing are several so-called diseases which also attack other cultivated members of the genus *Citrus*. Perhaps the most widely distributed and troublesome is the "foot-rot," which seems to be worst upon sweet oranges and lemons. It is feared in Australia, Europe, California, and Florida, in the last-named region having caused annual losses of \$100,000 or more. Though its origin has not been satisfactorily explained, it is readily recognized by the abundant exudations of gum near the ground, the yellow leaves reduced in size and number, the dry, peeling bark, and the dead twigs. Ultimately the trees become girdled and die. Good drainage, resistant stocks, the avoidance of over-cultivation, and stimulation with nitrogenous manures have been found the most satisfactory preventives. The removal of soil from the base of the trunk has been recommended as a remedy. Blight is another little understood affection. Only bearing trees seem to be troubled by it. The leaves wilt even in moist weather; watersprouts are produced in profusion on the trunk and main branches, but live only one or two seasons; the trees blossom abundantly the season after the wilting, but fruit fails to set and very little reaches maturity. The result is always fatal, even when only a small branch is originally affected. Scab, attributed to a species of fungus (*Cladosporium*), appears as excrescences upon the fruit and foliage. It is considered most troublesome upon lemons, and four or five applications of ammoniacal solution of copper carbonate is recommended as a remedy. (See FUNGICIDES.) "Die-back" is among the most troublesome pests of Florida orange orchards. It seems to be due to imperfect drainage and improper cultivation, which are succeeded by



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imperfect nutrition. Hence, improved drainage, cessation of cultivation, withholding nitrogenous manures, and reducing the present content of such foods in the soil by cropping the orchards with nitrogen-consuming crops such as grass, have all been urged as remedies. Mulching is also recommended. The characteristics of this trouble are the dying back of the tips of the twigs, reduction in the "set" of fruit, premature ripening, splitting, and shedding of the fruit. These characteristics may be seen in trees of all ages and varieties. The sooty mold (*Meliola camellia*), which also appears upon many other kinds of trees, is not a disease, but because of its presence in abundance may prevent adequate aeration of the leaves. It is a mold that lives upon the honey-dew (q.v.) which is exuded by various species of insects (APHIS, q.v.), which may be held in check by various insecticides, notably resin washes and hydrocyanic acid gas. It often covers the fruit with a felty mass which precludes sale.

Among the numerous insects that feed upon the orange are several caterpillars, the most prominent of which are perhaps the orange dog, the caterpillar of a butterfly (*Papilio cresphontes*), the saddleback caterpillar (*Empretia stimulea*), and the bag-worm (*Oiketicus abbotii*). The cotton-stainer or red-bug (*Dysdercus suturellus*) and the leaf-footed bug (*Leptoglossus phyllopus*) puncture the fruit. The Morellos orange worm, the maggot of a fruit-fly (*Trypeta ludens*), does great damage in Mexican orchards, and its possible introduction is dreaded by American orchardists, because the maggots destroy the fruit by tunneling in it. Several species of leaf-rollers and sucking bugs are troublesome, as are also various species of aphids, notably the orange aphid (*Siphonophora citrifolia*). In Florida and somewhat in Louisiana the white fly (*Aleyrodes citri*) is sometimes so abundant upon the foliage as to impair aeration of the leaves. It is not only a serious pest because of its sap-sucking habits, but because of its exudations of sugary matter upon which the smut fungus mentioned above lives. The rust-mite of the orange, also called the silvery mite of the lemon, because of the appearance of its work upon the two trees, sometimes injures the fruit; and the six-spotted mite (*Tetranychus sexmaculatus*), a close relative of the red spider of greenhouse notoriety, feeds upon the under sides of the leaves. The mites may be controlled by flowers of sulphur, which for the former should be added to kerosene emulsion.

The most dreaded group of insects, however, is that of the scale insects, of which there are a very large number that attack both foliage and trunks. With few exceptions the remedies found most satisfactory for these insects are resin washes and hydrocyanic acid gas. The most notable exception is the white or fluted scale (*Icerya purchasi*), an introduction from Australia. Having become exceedingly troublesome in California, its natural enemy, a lady-bird beetle, was introduced with the result that it is now rarely seen in the State. Other well-known scale-insects in California orange groves are the red scale (*Aspidiotus citricola*), the black scale (*Lecanium oleæ*); in Louisiana groves, the chaff scale (*Parlatoria pergandei*) is most important, but the purple scale (*Mytilapis*

*citricola*) is also somewhat troublesome, as is also the orange chionaspis (*Chionaspis citri*); in Florida groves, the chaff and the purple scale are well-known pests, as also are the long scale (*Mytilapis gloveri*) and the Florida red scale (*Aspidiotus ficus*). Many of the insects mentioned occur in Mexico, the West Indies, etc.; some of them in Europe, Australia and other parts of the world; but the insect fauna of foreign countries is rich in species that do not appear in the American list.

Consult: Risso and Poiteau, 'Histoire naturelle des Oranges' (Paris, 1822); Bonavia, 'The Cultivated Oranges and Lemons of India and Ceylon' (London, 1890); Garey, 'Orange Culture in California' (San Francisco, 1882); Moore, 'Treatise of Orange Culture in Florida, Louisiana, and California' (1883); Harcourt, 'Florida Fruits' (Louisville, Ky., 1886); Wickson, 'California Fruits' (San Francisco, 1891); Manville, 'Practical Orange Culture' (Jacksonville, 1883); Spalding, 'The Orange: Its Culture in California' (Riverside, Cal., 1885); B. Aliño, 'El Naranjo' (Valencia, 1900); various bulletins of the California State Experiment Station, Berkeley, Cal.; and publications of the California State Board of Horticulture, especially the one of 1902.

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**Orange Industry, The.** From the beginning, the orange has reigned as king in the international fruit trade of the world. The grape has always been and is still, greater in the value of its contribution to commerce and in the distance it safely traverses, but the grape rules not as a fruit, but through its manufactured products, while the orange carries its natural beauty, fragrance and flavor unchanged around the world. From the earliest times the orange has not only been accepted in northern climes as a most expressive exponent of tropical and sub-tropical salubrity, but by its own distinctive characteristics as a fruit it has won recognition as befitting the highest uses of mankind. By its nature, too, the orange ministers to its own commercial popularity. It endures long shipment; it ripens slowly and through a season of several months which constitute the winter in northern latitudes when local fruits are scant or absent and the refreshment in the citric juices most welcome. The production of such a commercial commodity has from the earliest times constituted an important industry.

It is a significant fact that though the orange thrives in the tropics it does not resent the slight touch of frost which characterizes semi-tropical situations. It is also significant that the fruit grown in semi-tropical countries, especially those which have a more or less distinctly marked two-season climate, differs in character from the strictly tropical orange and is firmer, heavier, more sprightly in flavor and with much better keeping and carrying qualities. The tropical orange has but small commercial importance; the semi-tropical orange rules in the markets of the world. That the semi-tropical orange should have this distinctive character is most fortunate, for it ministers directly to the will for industry which is superior in semi-tropical countries. By the seven degrees of frost which the orange tree will endure without injury, it has gained the 70° of

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north latitude, through which its fruit freely seeks a market. Because, though the tropical orange would reach most distant markets in small quantities, it could never attain the commercial supremacy which the fruit now enjoys.

The sweet orange is a native of Eastern Asia and was carried thence to India and to Asia Minor. It possibly reached Portugal from India through the early Portuguese navigators. Thus the distribution of the fruit was westward. The history of modern commercial orange growing consists of a series of progressive movements always trending westward and gaining in volume—the newer centres of production outstripping the older and ultimately largely displacing their product from the greatest markets of the upper divisions of the Temperate zone. When the Moors introduced orange growing into Algeria and Spain they displaced the traffic from Asia Minor and gave the Mediterranean region for several hundred years undisputed possession of the markets of the north of Europe and possession also of the American demand when that arose. When the Spaniards and Portuguese carried the orange to the West Indies and to Florida they laid the foundation for an industry which American enterprise developed in Florida until that district not only contended with the Mediterranean region for American markets, but was planning to invade northern Europe by direct shiploads when the demonstration came that the climate of northern Florida and of the Gulf coast westward was too treacherous for commercial ventures in orange growing—at least with the then popular varieties and methods of propagation. But as the Florida supply failed through the severe freezing of 1895, California came forward and is now not only supplying four fifths of the oranges consumed in the United States, but is selling the highest priced oranges in the London market against a world of competitors. This competition with the product of California is working hardship in the Mediterranean region because this region can more than supply Europe and needs American markets as an outlet. Italy has exported six million dollars worth of oranges and lemons in a year, but recently prices have declined and the interest is depressed. Every effort is being made to secure relief from local taxation and from duties imposed by north European countries. The Spanish product of oranges and lemons, which ranks next to the Italian, has to meet heavy tariffs in all countries except the United Kingdom, and the belief at Valencia is (U. S. Commercial Relations, Vol. 2, 1902, page 686) that the limit of British consumption of Valencia oranges at paying rates has been reached; in fact, the British markets collapsed under the heavy shipments of 1901. When it is stated that the value of oranges imported into the United Kingdom in 1900 was \$10,603,950 and such a free buyer has more than enough, it can be realized how important it is to the Mediterranean producers that the populous countries of Central Europe should hold less strictly to agrarian interests which aim to hamper the entrance of food supplies even if they cannot themselves produce them. Manifestly the American product can only enter such markets with a fancy product which will win an extra price, except as a little difference in the ripening season may afford an

opportunity. The commercial position of the orange in the United States is also such as to awaken apprehension. The present strength of the situation lies in the protective tariff and the *bête noir* of growers is the possibility of making gaps in it by reciprocity treaties. The product of the West Indies is a direct menace to the Florida product, which meets it in point of market season, and the Mexican product, which is undergoing expansion at the hands of American capitalists, is constantly feared by the California growers because the Mexican railway will give it quick entrance to the great central States and consequent advantage in distribution to the East and the Northwest. The orange from the West Indies and South Florida is different from the California orange in main ripening season and in character of the fruit, but the differences do not give full relief. With the late ripening varieties, the California grower extends his shipments into the autumn and thus laps upon the early fruit from Florida and Jamaica, while the parts of California which bring earliest maturity to the fruit are shipping before the southern fruit is cleared away. In fact, California can keep the markets supplied with oranges fresh from the trees and in prime condition the year around.

As to the difference in oranges grown under humid and arid conditions, the moisture being supplied by rainfall in one case and by irrigation in the other, there has been shown in the arid-region orange a superior density, thinness and texture of rind, higher sugar and higher acid percentages and a more sprightly or vinous flavor. The popular conception of the superior sweetness of the orange grown in humid countries is due not to a greater amount of sugar in the juice, but to less amount of acid. The following are the determinations of sugar and acid of fully ripe Southern California and Florida navel oranges:

	Total sugar per cent	Citric acid per cent
California navel.....	9.99	1.45
Florida navel.....	7.46	0.95

Of course, the quality of an orange is largely inherent in the variety, but all varieties are similarly changed by growth under humid or arid conditions of climate and soil, and this modification becomes a factor of much industrial importance. This fact is strikingly illustrated by the standing of the navel orange in California. This variety has been grown for a century or more as the chief orange in Bahia, Brazil, whence it was taken to California. In Brazil it demonstrated no shipping qualities, and according to Burke (U. S. Special Consular Reports, Vol. 1, page 411) would need to be picked before maturity if to be shipped, while as grown in California and Arizona it is picked at full maturity and is successfully shipped all over the United States and to Europe.

Orange growing in Florida has recovered from the serious reverses prior to 1900. The product of 1894 was about 6,000,000 boxes. Then came the disastrous freezing in December of 1894 and February 1895, with a temperature of 14° F. at Jacksonville, and in the latter year only 75,000 boxes were shipped. In 1903 the product was about 900,000 boxes. Confidence is being restored by the safety of the trees in the central and southern parts of the State and by the promising results of trial of harder varieties in

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the older citrus district in the northern part. In Louisiana the freezing of 1895 nearly annihilated the citrus fruit interest and there is thus far no disposition to resume production on a commercial scale. In the southwestern corner of Arizona there is a small orange industry which is successfully shipping navel oranges to distant markets. Conditions favor early ripening and an advantage is secured by sale in advance of the main California product. From California the shipments of oranges beyond State lines in 1903 were 21,577 carloads or 7,810,874 boxes. Planting during the last few years has been very active and it is reported by county assessors that in 1909 there were in California 7,000,000 orange trees, of which 2,000,000 were not yet of bearing age. The orange industry of the United States is now largely supplying the home demand for the fruit. Imports of oranges reached their highest value in 1883 at \$3,010,662.56 and have since then declined. The value in 1910 was \$82,546, of which one half was drawn from the British West Indies; one quarter from Italy; one eighth from Mexico, etc.

The orange industry of the United States is unique in the high social and financial standing of those who have engaged in it and in the striking features of its development. Both in Florida and in California large scale production was first undertaken by northern men who had gained wealth and had lost health in pursuit of it. They brought capital and commercial ability to the ventures which they exploited. The professional classes of the North also participated largely in the work, bringing scholarship, insight and experience in organization. There were a few also who possessed horticultural experience, but the other classes largely predominated. The result has been the development of an industry characteristically American in spirit and new in methods. It has borrowed very little from the practices of Old World orange growers. Free from tradition and prejudice, it proceeded rapidly upon the results of original investigation and experiment, establishing a system of culture and of commercial handling of the product which are without precedent in the older orange regions of the world.

There are several conditions essential to success in orange growing: soil, naturally rich or generously fertilized; temperature, suitable not alone to the life of the tree, but to the soundness and quality of the fruit; moisture, constantly available in adequate quantity, but not in excess; cultivation, to promote root growth by aeration and distribution of moisture; pruning to promote adequate wood growth and leaf action; protection from destructive insects and fungi. All these are indispensable to the commercial success of the enterprise, for though the orange tree is, in everything except the occurrence of low temperatures, hardy and long-lived, there is no profit in orange trees which are subjected to any form of privation or distress. To be profitable it must constantly display the signs of content, namely, deep green and glossy foliage, leaves large (according to variety) and heavy, juicy, golden fruit in profusion. The soils which best befit the tree are deep loams with a good amount of clay, although the tree is not fastidious about soil-texture if plant food and moisture are ample.

In Florida the orange soils are predominantly light at the surface and are largely sustained by regular fertilization, but a firm subsoil, for moisture retention within reach of the deeper roots and yet with drainage to obviate standing water renders light soil acceptable. A leachy subsoil, as for instance a deep sand stratum, is undesirable. In California the soils chiefly used for the oranges are clay loams of considerable depth without change in character and which are, therefore, of more enduring richness, but even the best and deepest soils in California are now showing the need of fertilizers to meet the heavy draft of the fruiting tree.

The orange tree is in danger whenever the temperature reaches the freezing point. The degree attained must, however, always be considered in connection with the length of time it prevails: for instance, four degrees of frost for an hour may do less harm than two degrees for two hours. As the temperature falls lower, the duration becomes less important. Five degrees of frost for a very brief interval may injure the ripening fruit and the tenderer leaf growth; ten degrees will ruin the fruit and considerably injure the tree. A temperature of 20° F. or a little less, may kill younger trees to the ground and older trees to the stump, while a temperature of 14° F. in Florida in 1895 killed to the ground the oldest trees, some of which were more than half a century old. The root, however, escapes destruction and will send up new shoots providing the injured top is soon removed. Where the temperature does not fall below 25°, injury has been successfully averted by burning numerous small fires among the trees. In California systematic use of electric alarm bells connected with thermometers to arouse the sleeping workmen and the lighting of small pots of crude petroleum has saved the fruit from injury by six degrees of frost, and such protection has been demonstrated to be profitable in places where such frosts are to be expected. The occurrence of frost is local in California and is not conditioned upon latitude. Oranges are successfully grown in suitable locations between lat. 32° and 40° N.—nearly 500 miles of distance, and the extreme low temperature is practically the same at about the same elevation throughout this distance. It is also true that owing to the intervention of high ranges of mountains giving protection from cold currents of air from the north and northwest, the season is earlier at the north than at the south, and the oranges from northern and central California are marketed in advance of the main crop from Southern California—the fruit being marketed previous to the time of the lowest temperatures (December and January).

In Florida much interest is manifested in experiments now in progress in that State under the auspices of the United States Department of Agriculture, to secure by inter-breeding of the sweet orange and the deciduous orange of Japan, varieties which shall combine the edible qualities of the former with the hardness of the latter. Oranges are grown with moisture from rainfall in Florida, while in Arizona and California irrigation is essential. Even in parts of California where deciduous trees fruit satisfactorily without it, the orange must be irrigated. The amount of water depends upon the

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age of the trees, the depth and retentiveness of the soil, the local rainfall, etc. The average amount is an annual total of fifteen inches depth of water over the whole surface of the land occupied by the trees, and the application is made in fractions at intervals of about three weeks during the dry season. Upon the lighter soils the land is laid off for each irrigation with low levees or dykes into squares enclosing one or several trees, according to the slope of the ground, and these squares are filled from an adjacent ditch. In the heavier soils where the water can be distributed well by lateral seepage, the water is turned into several parallel furrows plowed between the rows of trees and is allowed to run in small streams for 24 hours or more. Cultivation follows irrigation as soon as the ground has dried sufficiently to work well, for the purpose of preventing the surface from baking and preventing also the loss of moisture by evaporation. Thus the surface soil of a California orange orchard is kept constantly clean and mellow. No growth of weeds or other plants is permitted except when crops of legumes for plowing under green, to promote friability and to increase the humus-content of the soil, are undertaken. This cultivation of the surface promotes deeper rooting of the tree and aeration of the lower soil layers and the general thrift of the tree. California experience amply proves that irrigation and fertilization, unaccompanied by thorough and adequately deep cultivation, do not secure the best results.

The orange tree requires only light pruning after its proper shape is attained, but pruning to maintain the shape and to prevent the foliage from becoming too densely matted is essential. Pruning for shape has been more definitely pursued in California than elsewhere. The trees are grown with very short trunks; in fact, the lowest branches almost touch the ground. Cultivation is extended a certain distance beneath the tree by having a lateral extension to the cultivator. The men and teams never pass under the trees. The trees are encouraged to enclose themselves with a solid wall of foliage and all the work upon the tree and gathering of fruit is done with step-ladders in the spaces between the trees. It would be well nigh impossible to climb into the branches of such an orange tree, nor is it ever expected to do so. The trees are generally bluntly-conical or pyramidal in form, though some prefer a more roundish outline. The trees of the varieties most largely grown are low and of a semi-dwarf stature; only a few seedling trees of 30 feet or more in height are now to be seen.

Protection against injurious insects has been undertaken by American orange growers to an extent unthought of in the Old World, and commensurate results have been attained. The most successful method of treating orange insects (and they are chiefly of the class known as scale insects) consists in enclosing the tree with a tight canvas cover or tent and generating beneath it fumes of hydrocyanic acid gas by the action of sulphuric acid upon potassium cyanide. The process requires the best appliances and the most intelligent operation, and detailed accounts are given in the publications of the Agricultural Experiment Station of the University of California, which also prescribe the best remedies for other insects affecting the orange tree. Much has also been accomplished

by securing and multiplying parasitic and predaceous insects which have proved wonderfully effective in some cases. The details of propagation and culture of the orange differ according to natural conditions prevailing in the different regions and the local publications cited below convey the information. The same is true of the varieties which constitute the commercial product. The tendency is to concentrate production to a fewer number of approved varieties which are accepted as standards of excellence. In California, for example, the Bahia or Washington navel has constantly advanced in popularity until, by new plantings and by grafting and budding over old trees of other varieties, not less than three fourths of all the oranges grown in California are of that variety.

Current information and publications concerning the development of the orange industry can be obtained from the Bureau of Plant Industry, Department of Agriculture, Washington, D. C., and from the Agricultural Experiment Stations at Berkeley, Cal., and Lake City, Fla. The following books may be consulted: Risso and Poiteau, 'Histoire et Culture des Oranges' (1872); Bonavia, 'Cultivated Oranges and Lemons of India and Ceylon' (1890); Garey, 'Orange Culture in California' (1882); Moore, 'Orange Culture in Florida,' etc. (1886); Manville, 'Practical Orange Culture' (1883); Spaulding, 'The Orange: Its Culture in California' (1885); Harcourt, 'Florida Fruits' (1886); Wickson, 'California Fruits' (1900); Lelong, 'Culture of the Citrus in California' (1900); Hume, 'Citrus Fruits and Their Culture' (1904).

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University of California.

**Orange-melon.** See **MELONS.**

**Orange Oil,** an essential oil used in manufacturing perfumes and liquors. It is obtained from the rinds of oranges.

**Orange, or Gariep, gā-rēp', River,** South Africa, the most important southern river of the continent, rising in the Kathlamba or Drakensberg range, within 100 miles of the Indian Ocean, and traversing the country eastward to the Atlantic Ocean, with a slight northerly inclination. It describes numerous wide curves in its course of 1,300 miles, and separates Cape Colony on the south from the Orange River Colony, Griqualand West, Bechuanaland, and German Southwest Africa on the north. Area of basin, 325,000 square miles. Its principal tributaries are the Caledon and the Vaal, both joining it from the right. Its volume varies greatly between the dry season, when it is not navigable, and the rainy season, when it overflows its banks in the upper parts of its course. Its mouth is obstructed by a bar.

**Orange River Colony,** South Africa, formerly **ORANGE FREE STATE** from 1854 until 1900, when it was annexed by Great Britain after joining in the Boer invasion. On 20 Sept. 1900 it was made part of the Union of South Africa (q.v.). It is bounded on the north by the Transvaal, east by Natal, southeast, south, and southwest by Basutoland and Cape Colony, and west and northwest by Griqualand West and South Bechuanaland. Area, 48,326 square miles, divided into 19 districts. Capital, Bloemfontein (q.v.)

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connected by rail with Cape Town and Port Elizabeth, and also with the Transvaal and Natal. The country generally consists of vast undulating plains, lying about 5,000 feet above sea-level, and interspersed in many places with rocky hills called kopjes. The country is cold in winter, and in summer is liable to violent thunderstorms and long droughts; the climate, however, is generally healthful. The rivers that intersect the country are all small, and the boundary rivers, the Vaal and Orange, are unavailable for traffic. Agriculture and pasturing are the chief occupations, and wool, hides, and ostrich feathers the principal exports. Diamonds and other precious stones have been found in paying quantities, rich coal mines exist, and the State is said to abound in other mineral wealth. Gold was discovered in 1887.

Prior to 1836 this region was inhabited by Bushmen, Bechuanas, and Zulus. The colony was founded in 1835-6 by Dutch settlers from Cape Colony. It was annexed by Great Britain in 1848 in order to put a stop to the Boer outrages on natives; but in 1854 it was recognized as an independent state. The language of the country is a Dutch dialect, and the Dutch Reformed Church is the dominant religion. Under its independent régime the executive was entrusted to a president elected for a period of five years by universal suffrage; while the volksraad or parliament, elected for four years, exercised legislative functions. The history of the Orange Free State till 1899 was one of steady, peaceful progress, interrupted by hardly any stirring event, except some fighting with the Basutos down till 1869, and a more serious quarrel with the British government in 1871 concerning the Kimberley region. The latter dispute was settled by arbitration, under which the British government agreed to pay £90,000 to the Free State as compensation for its loss. In 1889 the state was admitted into the Customs Union of South Africa, and in that year also the railway from the Orange through Bloemfontein to the Vaal was completed. The greatest president of the state was Johannes Hendrikus Brand, afterward knighted as Sir John Henry Brand, who held office from 1863 till 1888. His successor was Francis William Reitz, who was latterly state secretary of the Transvaal republic. The last president of the state was M. T. Steyn, elected in 1896 and re-elected in 1901. In 1897 an alliance with the Transvaal for mutual defense was confirmed. When the war between Great Britain and the Transvaal broke out in October 1899 the Free State Raad decided to stand by its alliance treaty, and joined the Transvaal in the invasion of British territory. After the state had been invaded from the west and Bloemfontein occupied, it was annexed to the British empire under the name of Orange River Colony, by proclamation of date 28 May 1900, but President Steyn and a certain number of his followers still refuse to accept the annexation. (See SOUTH AFRICAN WAR.) Pop. about 80,000 whites, and 130,000 colored; total, 211,000.

**Orange-root.** See GOLDEN SEAL.

**Orange-tip**, one of the black and white butterflies of the family *Pieridae* (q.v.), which are conspicuously marked with an orange spot at the end of the front wings.

**Orangeburg**, ôr'ênj-bêrg, S. C., city, county-seat of Orangeburg County; on the Edisto River, and on the Atlantic Coast Line and the Southern R.R.'s; 81 miles north by west of Charleston and 50 miles south by east of Columbus. It was settled in 1735 by Swiss and Germans, was incorporated in 1755, and chartered as a city in 1870. It is in an agricultural and lumbering region. The chief manufacturing establishments are cotton mills, lumber and planing mills, a sash and blind factory, flour and grist mills, ice factory, brick works, wagon and carriage factory, and printing works. There are two colleges for colored pupils, one a State Industrial institution and the other under the auspices of the Methodist Episcopal Church. There are graded schools for both white and colored and seven churches. The four banks have a combined capital of \$210,000, and the annual amount of business is about \$1,500,000. The government is vested in a mayor, elected biennially, and a council of eight members, one half of whom are elected each year. There are only about 25 foreign born persons in the city. The city owns and operates the electric-light plant and the waterworks. Pop. (1900) 4,455; (1910) 5,906.

JAMES L. LINES,

Editor 'Times and Democrat.'

**Orangemen**, an Irish secret political society, the membership of which is composed exclusively of Protestants. The association aims to support and defend the British sovereign, the Protestant religion, and the ultimate union of Great Britain and Ireland. The society is named in honor of William III., Prince of Orange. The members appear at first to have been known by the name of "Peep-of-day Boys"; but the rude and illiterate mob of Peep-of-day Boys made way for the rich and influential organization of the Orange Society. Every member must belong to a private or subordinate lodge, and can be admitted only on proof that he is over 18 years of age, a Protestant, and of known loyalty. Any member marrying a Roman Catholic is expelled. Three or more subordinate lodges constitute a district lodge. Next above the district lodge is the county grand lodge, then the grand lodge, and finally the imperial grand lodge, at the head of which is the imperial grand master, the chief and supreme head of the association. The society was founded in the north of Ireland in 1795, for the ostensible purpose of counteracting the Catholic secret societies known as Defenders or Ribbonmen. The first Orange lodge was organized in the village of Loughgall, County Armagh, 21 Sept. 1795. As nearly all the peasantry of the country belonged to one association or the other, and as feeling ran high, the northern counties were in a very unsettled state for a lengthened period. Whenever the opposite factions met in considerable force insults were exchanged, and riots attended with serious loss of life often ensued. The law was powerless against them, as witnesses were intimidated, and juries sometimes refused to convict offenders belonging to their own order.

In 1808 the society extended its work to England, and in 1821 a grand lodge was founded at Manchester, but was afterward transferred to London. The subject more than once was brought under the notice of parliament, especially in 1813, and in consequence the grand

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lodge of Ireland was dissolved; but its functions in issuing warrants, etc., were discharged vicariously through the English lodge. The most memorable crisis, however, in the history of the society was the election of a royal duke in 1827 as grand master for England, and, on the re-establishment of the Irish grand lodge in 1828, as imperial grand master. The Catholic Relief Act of 1828 aroused the slumbering antipathies of creed and race, and the Orange association was propagated more vigorously than ever—not only in Wales and Scotland, but also in Canada and in the other colonies; and it extended its ramifications into the army. At this time the association numbered 20 grand lodges, 80 district lodges, 1,500 private lodges, and 200,000 members. In Ireland in 1828 and 1829, numerous bloody conflicts took place in the counties of Clare, Armagh, and Fermanagh. In 1834 it was discovered upon a parliamentary investigation that Orange lodges existed in 34 regiments of the army, and in the following year the duke of Cumberland, afterward king of Hanover, who had been elected imperial grand-master, was compelled to dissolve the society in Ireland. It was revived in 1845, and has at present many thousands of members in Great Britain and Ireland, in the colonies, especially in Canada, and in the United States. The Catholic Emancipation Act of 1829, the repeal movement of 1848, the disestablishment of the Protestant Episcopal Church in Ireland in 1869, and the Fenian and Nationalist associations were all warmly opposed by the Orangemen. In New York, 12 July 1871, a serious riot took place and several persons were killed. Other serious riots occurred in Belfast in 1880 and again in 1886. Great demonstrations take place annually on 12 July, the anniversary of the Battle of Aghrim and (reckoning by old style) of the Boyne. Consult: Lilburn, 'Orangeism; its Origin, Constitution, and Objects' (1866); Lecky, 'History of England' (1878).

**Orato'rians, or Congregation of the Oratory.** See **ORDERS RELIGIOUS**; **NERI, SAINT PHILIP**; **NEWMAN, JOHN HENRY**.

**Or'atories, The.** See **ORDERS, RELIGIOUS**.

**Orato'rio**, in music, a sacred composition consisting of airs, recitatives, duets, trios, quartettes, and choruses, with full orchestral and sometimes organ accompaniment, and opened with an instrumental overture. The subject is generally taken from the Bible and the text is often in a dramatic form, as in Handel's 'Samson'; it sometimes takes the form of a narrative, as in 'Israel in Egypt'; at times it is of a mixed character, as in Haydn's 'Creation'; and sometimes it consists merely of detached pieces, as in the 'Messiah.' Its origin has been usually ascribed to Saint Filippo de Neri, who, in 1540, founded the Congregation of the Oratory in Rome, one of the objects of which was to deter the young from profane amusements by rendering religious services as attractive as possible. For this purpose they began by the introduction of canticles, spiritual songs, and choruses, and subsequently, to increase the attractions, Scriptural songs and incidents were formed into dramatic poems, written in dialogue and set to music by the best contemporary composers.

These productions were recited and sung, with instrumental accompaniments, before and after the sermon. Stradella was one of the first of those who became celebrated for this exalted kind of composition, his oratorio of San Giovanni Battista being produced in 1670. The increasing popularity of the oratorio at length induced poets of eminence to supply suitable texts. The oratorio was introduced into England in 1730, when 'Esther' was sung in the chapel of the Duke of Chandos. It was performed by the children of the Chapel Royal in 1731, and in 1732 was publicly produced. This was followed by 'Deborah' in 1733; by 'Athaliah' in 1733; 'Saul,' and 'Israel in Egypt' in 1738; 'The Messiah,' 1742; 'Samson,' 1743; 'Judas Maccabæus,' 1747; 'Joshua,' 1748; 'Solomon,' 1749; and 'Jephtha' in 1752. Oratorios that have since appeared are: 'The Creation,' by Haydn (1798); 'The Mount of Olives,' by Beethoven (1803); 'The Last Judgment,' by Spohr (1825); 'Saint Paul' (1836) and 'Elijah' (1846), by Mendelssohn. Among oratorios by English composers may be mentioned: 'Eli,' and 'Naaman,' by Sir Michael Costa; 'John the Baptist,' 'The Resurrection,' 'Joseph,' and 'David,' by Sir G. Macfarren; and 'The Light of the World,' and 'The Prodigal Son,' by Sir Arthur Sullivan.

**Oratory.** A full treatment of this subject would include the History of Oratory which, like other important educational subjects, has its philosophy of cause and effect, effort and achievement, and inherency and environment. This phase of the theme is treated in the article **ORATORY** (q.v.). For a more extended study the reader is referred to the 'History of Oratory from the Age of Pericles to the Present Time,' by Dr. Lorenzo Sears. While the Oration is recognized as the highest form of public discourse the term Oratory is here used in its broadest sense and includes all kinds of public speaking from the lowest to the highest. The subject will be treated under three main divisions, the Kinds of Discourse, the Plan of Discourse, and the Qualities of Discourse.

### I. KINDS OF DISCOURSE.

1. **Business Remarks.**—Perhaps the lowest form of public speech is Business Remarks, which are usually made for the comfort or the welfare of the members or audience but have no bearing upon the object or discussions of the meeting. They should be brief, to the point and wholly without display; the chief temptation is to magnify them into a set speech.

2. **Committee Reports.**—Another low form of speech is the Report of a Committee through its chairman who acts as the spokesman of the committee. The report may be read as a concise statement adopted by the committee or it may be given in substance from notes or records, but in all cases it should be devoid of any coloring in phraseology or manner which might betray the chairman's own prejudice or convictions.

3. **Essays.**—The Essay when read by the author to an audience rises higher in the scale and is a much used form of discourse; when read by another or a mere clerk, though it may be an important document such as a presidential message, it becomes a low form of public ad-



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dress and rarely claims much attention from the audience. Fundamentally an Essay should be didactic, critical, and instructive in style; though with more color of language and a high degree of mastery of the subject matter so that the eye may not be confined too closely to the page, it may become a highly effective speech.

4. *Debates*.—The Debate differs from all other forms of speech in that the speaker expects a reply from opponents who hear him, his statements are made under the cross-fire of rebuttal and repartee and the debaters expect an immediate decision of the question by vote of the judges, the verdict of the jury or the voice of the people. The speaker may or may not choose his subject, but he finds himself in the attitude of attack or defense of some proposition or resolution to be established or disproved, with the resultant condition of the victor or the vanquished. A good question for debate must have two sides of about equal strength, it should have some human interest at stake and be worth discussion. In preparation for debate the speaker should make a good selection of material from books, magazines, and newspapers, study both sides of the question, clear his mind of all mere notions or prejudices for or against the proposition, and prepare a clear, logical outline or Debater's Brief setting forth the Burden of Proof and Presumption, the main Issue, the argument and the law and authorities relied upon in trying the case. The logical trend of debate is treated in the article on ARGUMENTATION (q.v.).

5. *Topical Speeches*.—A Topical Speech, as the name implies, is a speech on some topic or subject chosen by the speaker or assigned to him. It is a somewhat informal speech made to a limited audience. It should be as brief as possible and rarely include more than "three good points and three good illustrations." It has a wide range of subjects, some of which should be treated in a purely didactic way, while others may rise to the glow of conviction and give the flavor of good-will, pathos, or humor. The kinds of Topical Speeches are:

(1) *Toasts*, or After-Dinner Speeches of various degrees of importance. In recent years this form is much used by political aspirants for making public their ambitions and desire to "right the public wrongs."

(2) *Speeches of Introduction* of the Speaker to his audience, which should be brief and complimentary, but devoid of unwarranted assurances of the speaker's abilities.

(3) *Before Classes, Clubs, Conventions, and Associations* of an educational, religious, or benevolent nature, which should be didactic and very direct in style.

(4) *Gavel Speeches*, in which the retiring president of an association presents that emblem of authority to a newly elected president who is not yet ready to give a formal Inaugural Address; and the response by the president-elect who acknowledges the honor and asks the co-operation and support of the Association for his approaching administration.

(5) *The Notification Speech* of the Chairman of a committee to a presidential nominee in which he reiterates the platform of the party as expressed by the nominating convention.

(6) *The Acceptance Speech* of a presidential nominee made several weeks after the notification in which he gives his mature interpretation of the platform of the party and sounds the key-note of the campaign.

6. *Addresses*.—The Address is much more formal than the Topical Speech and is better suited to larger assemblies. There are six varieties as follows:

(1) *The Salutory* which is an address of greeting or welcome. In college life it is usually given by the second honor member of the senior class on the commencement occasion, but it has its counterpart in practical life in the address of welcome to some noted statesman, philanthropist, or other distinguished citizen or guest. It is necessarily complimentary in nature and requires good taste on the part of the speaker that his praise may not become fulsome or his admiration smack of hero-worship.

(2) *The Valedictory* is a formal farewell address usually made by the first honor graduate at the commencement exercises of a college. It calls up pleasant associations, enshrouds all shortcomings in a mantle of charity, extols those virtues which promise future success and attainment, and pledges loyalty to the treasured memories of the past. Such an address would be appropriate in practical life when a speaker retires from an important field of service. It admits of a high order of eloquence and should inspire hope and confidence in the administration of a successor.

(3) *The Commencement Address*, usually provided by the senior class or the literary societies, is a distinct college speech which inspires students to high standards of literary effort, lofty purposes and aims in life, and noble character. The form should be methodical, the style dignified, and the language a model of good English and rhetorical excellence. Great care should be exercised in the selection of the speaker who should be a literary man of high character, marked achievement, and good delivery.

(4) *The Inaugural* of the President of an association or of the nation, the Governor of a state, or the Chairman of a large and formal convention is an important kind of an address. The speaker should acknowledge the honor conferred upon him, pledge faithfulness to duty and proclaim his policy. He should not criticize his predecessor, but show a strong desire to build by the light of past administrations.

(5) *The Political Address* has for its primary aim the interests of the party or its official candidates, and asks an expression of the will of the people in a vote on election day. The occasion and message of such an address ranges from the harangue of the stump speaker to the most dignified and learned discussion of vital national issues by some great statesman. The speaker should not be too statistical nor use the language of the political demagogue, but try to be clear, candid, and generous to opponents.

(6) *Addresses Before Conventions, Congregations, and other large bodies of people* of similar tastes and convictions, not of a political nature, such as Teachers' Institutes, Chautauqua assemblies, Synods, and Conferences, vary according to the occasion and the message, but

they are distinctly unlike the other addresses named. They are generally of a professional, educational, scientific or moral order, and deal largely with methods, motives, and aims of work in a given sphere of activity.

7. *Lectures*.—The Lecture is a well recognized form of speech somewhat akin to the Address; yet it is more formal, bears the stamp of greater preparation and is used repeatedly in about the same language and form. There are two kinds:

(1) *Lectures to Classes in Schools, Colleges, and other institutions*, which should be didactic in style, precise in statement, methodical in arrangement, progressive in development, and so presented that the students may fully comprehend the subject treated and take notes for future study.

(2) *Platform Lectures* before popular audiences, the object being instruction and entertainment. No matter how scientific the subject it must be treated in a popular way with ample illustration and sufficient reduction of technical terms to common phraseology so that the audience may fully understand the speaker. There is a large demand for the highest type of this form of public entertainment.

8. *Sermons*.—The Sermon is a spoken discourse by a duly ordained clergyman on some theme or text from the Bible and delivered as a part of a church service. There are six varieties as follows, the first three of which are named by Dr. Broadus from the standpoint of the subject or text, and the last three are considered from the standpoint of the occasion:

(1) *The Subject Sermon* in which the text from scripture only suggests the theme, the analysis of which and plan of treatment must be entirely constructed by the preacher.

(2) *The Text-Sermon* in which the analysis, headings, and subdivisions are all inherent in the text, leaving the tactful preacher, as Dr. Shedd put it, "to find the hidden skeleton."

(3) *The Expository Sermon* which is exegetic in method—a purely scriptural form of preaching—in which several passages or even a whole chapter may be expounded.

(4) *Didactic Sermons* relating to church government, influences, beliefs, creeds, or the ethics of religion.

(5) *Exhortatory Sermons* which are more emotive in nature and intended to move the will of the congregation to immediate action.

(6) *Special Occasion Sermons*, such as the dedication of a church, installation services, the institution of baptism or the sacrament. Sermons on Thanksgiving Day, Christmas, Easter, and on fraternity, memorial, and funeral occasions.

9. *Orations*.—The Oration, as we conceive it, is the loftiest type of public speech and it marks the highest attainment of the public speaker. It is dignified and formal in style, clear in logic, forceful in thought, sound in philosophy, eloquent in language, emotive and persuasive in spirit, and, withal, it is constructed with the plot and motive of a great drama. It gathers up the salient facts of history and experience bearing upon the subject discussed, holds them up in the searchlight of the present

day and generation, and weaves them into the fabric of the future. It moves the audience by persuasive, climactic impulses and stirs men to action. It must spring from the orator's own conviction and bring a message that is genuine, unmistakable, and generally optimistic. Its object is to educate and inspire the masses, elevate the standards of morality and citizenship, or bring about great civic reforms and national movements. The stamp of its influence is clear in the national life and character of the past, it is a vital, living force in the civil polity of the present, and its promise of power and usefulness in the future is so great that it should be placed in the curriculum of every college and university that lays claims to a thorough preparation of youth for the duties and responsibilities of life.

Perhaps owing to a failure to distinguish the oration from the other forms of speech which we have named the rhetoricians of the present day have not greatly improved the classification of Orations given by the ancient Greeks and Romans. In view of the preceding discussions we believe that the terms Commemorative, Panegyric, and Civic will prove comprehensive and inclusive.

(1) *The Commemorative Oration* celebrates some great event of history and aims, as Dr. Sears states, at "perpetuating something which is worth saving from oblivion, and extending into the future what is too valuable to be restricted to the brief period when it was present among mankind." It is a high and inspiring order of oratory. Noble deeds are idealized, the outgrowth of past events and their relation to the needs of the present is shown, and eloquent strains of warning or triumph mark the speech. Webster's two "Bunker Hill Monument" orations and Everett's oration on "The National Cemetery at Gettysburg" are notable examples of Commemorative oratory.

(2) *The Panegyric Oration* is a formal and elaborate eulogy upon some great person who has passed away. It is an old form of oratory practiced by almost all the great orators of the world, and, having stood the test of ages, it will doubtless live as long as virtue is praiseworthy among men. It combines the strongest points of demonstrative oratory and employs the highest type of eloquence. The style must be elegant, the praise truthful, the encomium specific and not general, and the finished life and its closed events held up as an inspiration to the living for future guidance. George William Curtis' oration on "Wendell Phillips" and James G. Blaine's eulogy on "Garfield" are good illustrations of Panegyric oratory.

(3) *The Civic or National Oration* is a deep, earnest discussion of great ethical principles, civic laws, social relations, or economic movements necessary to the welfare and perpetuity of the state or nation. It has for its aim the elevation of standards of citizenship, national prosperity and international relations. Like the other forms of orations it employs the philosophy of history in forecasting future events, and rises to the loftiest eloquence whenever questions of great human interest are considered. "The Labor Problem," "Anarchy," "Arbitration," "Obedience to Law," "The Puritan and the Cavalier in our National Life," and

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"Internationalism" are appropriate subjects for civic oratory.

### II. THE PLAN OF DISCOURSE.

All kinds of discourse should be constructed according to a good plan which will secure proportion, insure growth, and prevent digression. Rhetoricians give variously from two to eight divisions of the discourse, but the simple outline, Introduction, Main Discourse, and Conclusion seem to meet the demands in all kinds of speeches.

1. *Introduction.*—The importance of the first impression is of great moment to the speaker as well as to the audience. With a good Introduction the critical attitude of the audience gives place to open-mindedness and acceptance of the truth as it is presented in the Main Discourse and enforced in the Peroration. At the start the speaker must consider the occasion, the object of his speech, and the mood of the audience he confronts. He may enjoy the support and sympathy of his hearers, or he may have their prejudice, false impressions or ignorance to overcome before he can discuss his subject successfully. To cover all cases we may say that the Introduction should be local as to time, place, and object of the speech, generally concrete and always definite in statement, deferential to the audience and to the preceding speakers if there be any, conciliatory if conciliation is needed, dignified both in commendation and condemnation, calculated to awaken attention and interest, brief as the occasion will allow, and it must name the subject or proposition to be discussed.

2. *Main Discourse.*—The distribution of materials, the statement of facts and the logical trend of discussion are closely allied to the subject itself and must vary according to conditions; but one of the following orders, or a combination of them, will apply to any kind of speech:

(1) *The Historical Order* arranges the facts, events, statements, proofs, and conclusions, with regard to the time of occurrence. Antecedents relating to the past, Circumstances relating to the present, and Consequents relating to the present and the future are all arranged chronologically. Webster's speech in the trial of Knapp for the murder of Captain Joseph White, delivered 3 Aug. 1830, is an excellent illustration of the Historical Order of discussion.

(2) *The Logical Order* links all incidents, testimonies, proofs, and arguments into a complete chain of Argumentation, the whole subject being to convince the judge, jury, or audience. (See ARGUMENTATION.) Burke's speech on "Conciliation with the Colonies," delivered in the House of Lords 22 March 1775, illustrates the Logical Order.

(3) *The Distributive Order* arranges co-existing matters into groups and distributes these groups in their relation to each other and to the general aim of the speech. It often reverses the Historical Order. This method is especially adapted to the more eloquent styles of oratory such as the Panegyric or Civic oration and has been employed by the greatest orators. It tests the tact and skill of the speaker who must conform unswervingly to the three great principles of rhetorical structure, Unity, Climax, and Proportion.

3. *The Conclusion or Peroration.*—This is the crucial point for the skill of the speaker; it is the place of deepest interest and also of greatest peril. It leaves the final impression which may prove a triumph or a dramatic catastrophe for the orator. It should be carefully prepared in thought, language, and even in delivery. The essential requisites of a good Peroration are Summary, Brevity, and Termination, and in formal oratory the heightening effect of eloquent language should be added.

### III. THE QUALITIES OF DISCOURSE.

Various qualities of Discourse from Quintilian's three to Professor Bain's seven, have been described by rhetoricians. We suggest the following as inclusive terms for all speeches:

1. *Clearness*, which is the quality by which the thought and emotions are presented intelligibly to the audience. It deals especially with the diction and the syntax of sentences and the logic of thought. To insure clearness the speaker should cultivate the habit of clear thinking, study authors who are notably clear in style, have a definite knowledge of the subject, and the main issues, follow a well ordered Plan of Discourse and yield to wholesome criticism.

2. *Force* is that quality which renders discourse capable of strong, vital utterance and energetic, expressive action. It is acquired by the selection of weighty idiomatic words whose meaning and phonetic constituents are full of power, by the use of strong, figurative language, by a skillful interweaving of short, energetic sentences with the necessary longer ones, and by arranging the Plan of Discourse with special reference to climax and dramatic strength.

3. *Persuasiveness* is that quality of discourse which appeals to the will through the emotions. Persuasive passages should be in proper proportion to the thought-action of the speech, and follow only when the minds of the audience have grasped the situation and when the enforcement of truth has been accomplished; hence persuasion is the special function of Climaxes and the Peroration. The language should be fraught with expressive words, pathetic or stirring associations of ideas and experiences, there should be a judicious use of expletives and striking figures of speech, and, above all, the speaker should manifest an earnestness of purpose and a full mastery of elocution or delivery.

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**Oratory, History of.** Oratory was first made a subject of study among the Greeks settled in Sicily, the occasion of their directing their attention to it being the general unsettlement of all titles to property in Syracuse in consequence of wholesale confiscations. The exiles, on returning to their country, appealed to the government for restoration of their possessions, but that could be effected only by their appearing and appealing in person to the courts. In this emergency Corax, by drawing up a few simple rules for the orderly and effective presentation of their claims, and drafting a skeleton of an address to the court, laid the foundation of the art of oratory on

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which, 150 years later, Aristotle reared his immortal work on Rhetoric or Oratory, "incomparably," says Professor Jebb, "the most scientific work which exists on the subject: it may be regarded as having determined the main lines on which the subject was treated by nearly all subsequent writers"—of modern as of ancient times. But between the time of Corax and that of Aristotle was a period of development of the art, both in its theory and its practice, and that period is the golden age of Grecian, or rather Attic, eloquence. Corax had at the first mere imitators who developed the art of logography or of composing speeches or pleadings to be made in the courts by the parties to suits. The logographers then began to furnish to their clients, instead of the mere divisions and heads of a pleading, the whole speech written out, and trained their client in the memorizing and delivery of it. The first notable logographer at Athens was Antiphon (480-410 B.C.), but he had been preceded by a few years by the exceedingly brilliant but shallow sophist Gorgias, native of Leontini in Sicily, an orator and professor of oratory, who by his highly ornate style and his daring paradoxes commanded the interest of all and created a veritable furore: he exacted enormous fees for the privilege of attendance at his lessons in oratory, and had for his pupils the most gifted and aspiring of the Athenian youth. He does not appear to have committed to writing the secrets of his special art: he laid the principal stress on delivery, elocution, and proposed to his pupils as topics for declamation the philosophical speculations of the Eleatic school and others of an ethical nature. But Antiphon, though he was only a writer of speeches that were to be delivered by others, is reckoned as one of the ten great Attic orators. He composed speeches not only for parties in suits at law, but also for speakers in the popular assembly, and thus he is to be regarded as the founder of the art of political oratory at Athens. Never in his life till in its last act did he appear as a speaker in the assembly of the people or in the courts of law. When he was brought to trial on the charge of high treason he delivered in self-defense a speech, of which, though it proved ineffectual to save him from capital punishment, Thucydides declared that no abler oration was ever made by any man in a like position. There are extant 17 orations composed by him, among them three "tetralogies"—presumably examples of forensic oratory designed to serve as school exercises and models; each of the tetralogies comprises four speeches such as might be delivered in a trial for murder, namely, (1) the charge presented by the accuser; (2) the defendant's reply; (3) the accuser's answer to this; and (4) the rejoinder of the accused. The style of Antiphon's orations is rugged and lacks grace and elegance, as compared with that of most of his illustrious successors, but his discourse is ever forceful and convincing. Lysias, the third of the Attic Ten, was also a logographer, but he was besides a man active in public life, and in addition to orations prepared for clients to be delivered by them in the law courts or in the assembly, he composed and himself delivered a great many political and forensic speeches: more than 160 orations of Lysias are mentioned by ancient authors; of these, 34 are extant, a few of them in fragments. In his simple but refined style he

presents a contrast to Antiphon: his vocabulary is simple and pure, the vocabulary of common life; he makes little use of showy rhetorical figures: he excels in vivid description; and he passes gracefully from the full and flowing periodic style to the style of simple narrative. He was the first to fit the style of the speeches he wrote to the character of the client, who was to deliver them before the court. Isocrates (436-338 B.C.), an eminent teacher of oratory, and one of the founders of the art in its highest development, was also by profession a logographer. Twenty of his orations are extant, marked by great elegance of style, but inferior in natural simplicity to those of Lysias, and in fire and fervor to the orations of Demosthenes. To Isocrates Cicero awards the praise of having brought Attic oratory to perfection. Among his pupils were very many who attained high eminence as orators: from the scant records that are extant are gathered the names of 41 famous orators who are known to have come from the school of Isocrates, among them the great Isæus (390-353 B.C.), who, like his master was a logographer and perhaps the most eminent representative of that profession: he was deeply learned in the law, and was also a great political orator: in forensic oratory he was without a peer. Demosthenes is said by some ancient writers to have been one of his pupils. With Demosthenes and Æschines closes the period of the grand Attic oratory.

After Greece fell under the Macedonian domination Grecian oratory had no longer any arena in public life and it degenerated rapidly. The tradition of the best days was, it is true, preserved in Aristotle's great treatise, and the monuments of Attic eloquence remained, but the virile eloquence of the great orators of Athens was ill fitted for the political circumstances of enslaved peoples. The taste for oratory was industriously cultivated by the Hellenes of Asia Minor and of the Greek cities as an elegant accomplishment, and in their hands it became merely one of the arts of decoration. A pompous, florid style, abounding in exquisite figures of speech, extravagant metaphors, and empty but sonorous periods displaced the sane, temperate speech of the Athenian masters and exemplars of oratory. And it was while Greek eloquence was in this low estate that the Latins first became acquainted with the arts of Greece. Fortunately the works of the great orators and of the great theoretic expositors of the art—Isocrates, Aristotle, Theophrastus—were still extant, in which was to be found the corrective of this debased Asian oratory; and it was the good fortune of the greatest of the Roman orators, when he resorted to the Greek schools for training in the liberal arts to have his studies from the first directed to the authentic works of those great masters, and not to the extravagances of the Asian school. Cicero's great rival in aftertimes, the orator Hortensius, was captivated by the glitter of Asianism, and sought to win verdicts in the courts by resonant sentences and flowery rhetoric rather than by clear, calm argumentation commended by a chaste, temperate style of speech. Cicero's orations, of which 56 are extant, are either deliberative and political, delivered in the Senate or the Forum, or judicial, forensic, all in defense of accused persons, with the exception of the memorable four ora-

## ORATORY OF SAINT PHILIP—ORCAGNA

tions against Verres, in which Cicero acts as accuser and prosecuting attorney. He wrote three treatises on the subject of oratory, *De Oratore*, *Orator*, and *Brutus*, and there are extant two other treatises relating to the art of oratory, *De Inventione* and *Rhetorica* which have been ascribed to him as author. In the treatise *De Oratore* he expresses his view of what the consummately accomplished orator should be: he must not be the mere rhetorician, neither should he be the mere technical lawyer or the keen political partisan; but he should be the man of thorough education and perfect taste, who can speak on all subjects out of the fullness of his mental store, with variety and copiousness. Such is Cicero's ideal orator, an ideal which unquestionably he approached as nearly as any orator in antiquity, though of course even in his time it stood immensely remote. Though Julius Cæsar, "the greatest name in history," was not by profession an orator, he has been justly rated as second only to Cicero as a master of the art of oratory: it is not to be doubted that had he devoted himself to forensic practice and the oratory of the Senate he would not have been inferior in that career to any of the great orators even of Athens: to Julius belongs the unique distinction of having quelled a rebellion by a speech. Quintilian, born about 80 years after Cicero's death, was a very eminent instructor in the art of oratory and wrote on the subject a practical systematic treatise, *De Institutione Oratoria*, remarkable for its sound criticism and faultless taste.

The triumph of Christianity was in part at least a triumph of oratory: the appointed chief means of disseminating the religion was preaching. The Apostle Paul was an orator of no mean rank. The apologies written in defense of the Christian religion in the 2d and 3d centuries and addressed, most of them, to the Roman emperors by Justin Martyr, Athenagoras, Melito, Apollinaris, Miltiades, Minucius Felix and others were, except that of the last named, in effect harangues written, not spoken: the style is the oratorical style, but it is oftenest of the debased Asian kind. Many of the Fathers of the Church, as Tertullian, Cyprian, Athanasius, Basil, Cyril of Jerusalem, the Gregories (of Nazianzum and of Nyssa), Augustine, Ambrose, were eminent as orators no less than as theologians and controversialists. In the Middle Ages the art of oratory played no inconsiderable part when employed for religious instruction or moral exhortation by Bernard, Dominic and his Preaching Friars, Bonaventure, Thomas Aquinas, Berchthold of Ratisbon, Vincent Ferrer, Tauler, etc.

Political oratory was meanwhile in abeyance: it had its revival in England in the times succeeding to the Revolution of 1686: since that time the English bar and the British House of Commons have been almost continuously illustrated by the genius of orators hardly or not at all inferior to those of ancient Athens. It was a crisis in the affairs of the little Syracusan Democracy that gave occasion for the first essay to formulate the laws of the art of oratory; and it is in great crises of states that the highest powers of oratory are called into action. And as in England the question of war against the American colonies, the misdeeds of proconsuls in India, the war with Revolutionary France, Catholic Emancipation, Abolition of the Corn

Laws, Liberation of the Blacks, etc., gave inspiration to orators; so here in the United States the questions of Independence, of forming a Constitution, of Nullification, of Abolition of Slavery, of maintaining by arms the Union, of Tariffs, etc., have called into exercise the oratorical powers of our Henrys, Otises, Hamiltons, Clays, Websters, Sumners, Phillipses.

**Oratory of Saint Philip.** See **ORDERS, RELIGIOUS.**

**Orb-weaver**, a spider of the group *Orbicularia*, represented most familiar by the garden spiders of the family *Epeiridae*, which form their webs on a flat plane in the form of concentric lines of thread sustained by cables radiating from the centre of the coil to various points of support. See **SPIDER.**

**Orbegoso**, Luis José, loo-ēs' hō-sā' ōr-bā-gō'sō, Peruvian general: b. Chuquisongo, Huamachuco, Peru, 25 Aug. 1795; d. Lima, Peru, 1847. He was educated in the College of San Carlos, Lima, and entered the militia in 1815. He was a man of wealth and high position and, engaging actively into military and political affairs, attained great popularity among his countrymen. In 1833 he was chosen president of the republic and though the election was not strictly legal he held the position without interference until 1834 when his predecessor, Gamarra, raised a rebellion against his authority. Several revolts followed and Orbegoso was defeated. He accepted the intervention of President Santa Cruz of Bolivia, and the Peruvian confederation was formed with Orbegoso as president of North Peru. When the alliance was dissolved in 1836 he was exiled by Gamarra and his followers, but returned to Peru several years before his death.

**Or'bis Pic'tus.** See **COMENTUS, JOHANN AMOS.**

**Or'bit**, in astronomy, the path of a planet or comet; the curve-line which a planet describes in its periodical revolution round its central body. The orbits of the planets are elliptical, having the sun in one of the foci; and the planets all move in these ellipses in accordance with the law that a straight line drawn from the centre of the sun to the centre of any one of them, termed the radius vector, always describes equal areas in equal times. Also, the squares of the times of the planetary revolutions are as the cubes of their mean distances from the sun. The satellites also move in elliptical orbits. See **ASTRONOMY.**

**Orca**, a genus of whales. See **KILLER.**

**Orcagna**, ōs-kān'yā, or **Arcagnolo**, ār-kān-yō'lō, easel names of Andrea di Cione, Italian painter, sculptor and architect: d. probably 1368. He belonged to the school of Giotto as a painter, but his energy and dramatic characterization indicate a great advance on the flatness and conventionality of the Giottesque style. His main works are three large frescoes: 'The Last Judgment'; 'Hell'; and 'Heaven' in the Strozzi chapel of Santa Maria Novella at Florence. In the same chapel is an altar-piece marked with his name and the date 1357: it represents Christ handing the keys to Peter and a book to Thomas Aquinas. In the London National Gallery is his 'Coronation of the Virgin by Christ,' a large altar-piece which originally belonged to the Church of San Pietro Maggiore

## ORCEIN — ORCHARD CULTURE

at Florence. All these works exhibit powers of exquisite design, graceful composition, and delicacy of coloring. The proportions of the chapel of San Michele and its elaborate tabernacle furnish a magnificent testimony to his powers as a sculpture and architect.

**Orcein**,  $C_7H_7NO_5$ , the chief ingredient of the red and purple dyestuffs known under the name of archil (q.v.). It is formed by the action of ammonia and oxygen on orcin,  $C_7H_4O_5$ , and consists of two substances, one having the composition  $C_{10}H_{11}NO_5$ , the other  $C_{10}H_{11}N_3O_5$ . When ammonia is added to a solution of orcin, and the whole is exposed to the air, the liquid assumes a dark-red or purple tint by the absorption of oxygen. On acidulating with acetic acid, a dark-red precipitate of orcein is obtained. Orcein is slightly soluble in water and freely soluble in ammonia and fixed alkalies, with a purple or violet color; it is very soluble in alcohol.

**Orchard Culture.** An orchard is a collection of fruit-bearing trees, especially of those bearing deciduous fruits, as the apple, pear, peach, plum, cherry, apricot, and quince; for oranges, olives and various cultivated nuts, the term "grove" is probably in more general use. American orchard culture differs widely from European. European conditions require conservation of space and make necessary such artificial methods of training as dwarfing, training upon walls, forming cordons, espaliers, etc.; also that the fruit itself shall be of special attractiveness with respect to size, color, flavor, or some other desideratum. As a result, far more hand-work is required in European fruit plantations than in American. In America the intensive methods of Europe are rarely practised, since land is plentiful and cheap, and since the demand is for a large quantity of fruit rather than for fruit of exceptional quality. The trees therefore are left more nearly to nature, aided by as little hand labor as possible. As a consequence the orchards of America are the most extensive in the world. According to the United States census of 1900 the total number of fruit trees in orchards was 367,164,694, of which 55 per cent were apple, 27 per cent peaches and nectarines, 8 per cent plums, and 4.5 per cent pears. In that year the yield of fruit was valued at \$83,751,840.

During the closing quarter of the 19th century, and especially during the last decade, the management of American orchards was decidedly improved. Prior to that orchards were largely mere adjuncts of the farm, supplying little more than the home need, or at most the small demands of local markets. As a result the trees were allowed, usually, to shift for themselves; harmful insects thrived, plant-diseases spread and the quality of the product was poor. As means of shipment of fruit were improved more distant markets could be supplied and the progressive men began to devote attention to their orchards. Great care is now taken in the selection of land and site for an orchard; not only must the tree be considered with respect to its nourishment, but the effects of cold, heat, wind, light and other factors must be kept in view. For instance air drainage has been found to be of equal importance to water drainage. Orchards planted in hollows generally

fail because of the settling of cold air from the high ground, and good managers now avoid a situation where no draft of air will tend to keep the trees clear of such chilling influences. The land selected is thoroughly prepared by plow and harrow before the trees are planted, instead of placing them in separate holes dug in the sod. The trees planted, rarely more than two years of age, are carefully trimmed root and branch, and set in rectangles or hexagons, the latter method permitting cultivation in three directions and being more economical of the land. Instead of allowing the land to grow up with weeds and grass as formerly, modern practice keeps it cleanly cultivated until mid-summer, and in many cases a "cover-crop" is planted for plowing under as a green manure in the following spring. During the first three to six or perhaps eight years, according to the kind of fruit, distances between trees, etc., many orchardists plant hoed crops between the trees to offset the cost of cultivation. Cereals and grasses are modernly almost never sown in orchards except to reduce the amount of nitrogenous food in the soil and then only when such food is so abundant that the trees are making too great a growth of wood to allow of profitable productivity. The cover-crops act more or less as checks to growth and thus help in the ripening of the wood and the buds. They also serve to hold snow, and to check washing, puddling and leaching of the soil, and if they consist of beans or similar legumes, they enrich the soil with nitrogenous food derived from the air.

Thinning of the fruit has been found of distinct advantage with many kinds, especially when the grower aims to supply the annually increasing demand for finer individual specimens. The objects gained are the removal of inferior, diseased specimens, the destruction of many insect pests, and the saving of plant-food which can be utilized by the tree in the development of finer fruits or other parts. It is practised most with such fruits as peaches, pears and apricots, these supplying a fancy market; but is also gaining in favor with apples, plums and even cherries. Often the practice removes two thirds of the fruits set. But the number lost is usually more than offset by the increased bulk of the crop matured, and by the resultant price.

Whereas fruits, even peaches, were formerly marketed in bulk, they are now shipped in small individual packages, even apples being sent to market more and more in smaller packages than barrels. This change has been brought about by the demand of consumers who dwell in cities, where they have small facilities for keeping perishable food-materials and must buy their fruit in small quantities, more often than in large amounts. Means of transportation and storage facilities have developed in pace with this change in the market. Refrigerator cars have made possible the carriage of products hundreds, or even thousands, of miles to a final market, and the erection of cold-storage warehouses at both the shipping and the receiving ends of the line has enabled producers and dealers to control the supply and regulate prices to a great degree. The disadvantage in such a method of marketing fruit is the poor quality of fruits shipped long distances; they must be gathered before their flavors have fully developed, and the con-



sumer never learns from the fruit obtainable in his distant market what the fresh article is like.

Consult: Bailey, 'Cyclopedia of American Horticulture' (1900-2), and 'Principles of Fruit Growing' (1900); Thomas, 'The American Fruit Culturist' (1897); and many bulletins of the agricultural experiment stations, especially New York, Michigan, Wisconsin, California, and Vermont; also the annual reports of horticultural and pomological societies, particularly the American Pomological Society, Western New York, Massachusetts, Michigan, and Missouri Horticultural Societies.

See FRUIT; FRUIT TRADE; FERTILIZERS; FUNGICIDES; TILLAGE; etc.

**Orchard Grass.** See GRASSES IN THE UNITED STATES.

**Orchard Oriole.** See ORIOLE.

**Orchardson, or'chard-søn, William Quiller,** English painter: b. Edinburgh 1835; d. 13 April 1910. He entered the Trustees' Academy and encouraged by the success of his exhibits in the Royal Scottish Academy's exhibitions, went to London in 1863 where he contributed to the Royal Academy and other art exhibitions. In 1868 he was elected an associate of the Academy, and in 1877 became an Academician. Orchardson's works consist almost entirely of historical and genre pictures and portraits. Some of his chief works are: 'The Challenge' (1865); 'Christopher Sly' (1866); 'Napoleon I. on Board H.M.S. Belle-rophon' (1880), purchased under the terms of the Chantrey Bequest; 'Un Mariage de Convenience' (1884); 'Salon of Madame Recamier' (1885), in which many distinguished persons are introduced; 'The Rift within the Lute' (1887); 'The Young Duke' (1889); and portraits of the Bishop of St. Asaph, Prof. Dewar, Viscount Peel, Lord Kelvin, and others. Almost all his paintings appeared in the Royal Academy exhibitions. He was a painter of brilliant technique with few rivals in certain effects of color and chiaroscuro, but his work sometimes may be said to lack solidity and depth.

**Orchestra,** a term applied to the space in theatres between the seats occupied by the spectators and the stage, appropriated by the Greeks to the chorus and the musicians, by the Romans to the senators, and in our modern theatres to the musicians. The name is also used for the part of concert-rooms assigned to the vocal and instrumental performers; and, lastly, is applied to the instrumental performers, collectively taken. A modern orchestra in the last sense consists of stringed, wind, and other instruments, in varied proportions, according to the number of instrumentalists. The stringed instruments should greatly outnumber the wind instruments. A very effective small orchestra for a moderately sized concert-room may be made up of the following proportions: Six first violins, five second, three altos, two violoncellos, two double-basses; two flutes, two oboes, one clarinet, one bassoon, one cornet, one trombone, two horns; and one kettle-drum—twenty-nine instruments in all. The trombone may be left out without sensibly lessening the efficiency. See BAND; MUSIC; VIOLIN; etc.

**Orchestrions.** See MUSICAL INSTRUMENTS; MECHANICAL.

**Orchha, or Urchha** (also called TEHARI), a native state of Central India, area about 2,000 square miles; pop. 333,020. The town of Orchha, the former capital, is on the river Betwa, not far from Jhansi. It contains an imposing fort with a palace. The town of Tehari, the present capital, the residence of the ruling chief, is about 40 miles south of Orchha. It contains the fort of Tikamgarh, by which name the town is sometimes called. Pop. 17,610.

**Orchid, or'kid,** the name of a group of plants (order *Orchidaceæ*) containing more than 12,000 known species and many thousands of varieties, many of which are highly valuable commercially. They are as a whole by far the most interesting order of plants of the entire vegetable kingdom, because of their extraordinary mode of growth and existence, their great age and endurance, their curious habits, and the varied forms of their flowers, which are distinct from all other classes of plants, fine in texture, and of glowing and exquisite colors. They are remarkable also because of their ready adaptability and free permission of cross-breeding or cross-fertilization, which also practically makes them more fascinating than all other orders or tribes of plants. This is true in their natural habitat, as well as under practical cultivation. This fact also accounts for the almost endless varieties of flowers and colors.

The flower of the orchid as a rule is made up of the following parts: sepals, petals, labellum or pouch, and column or crest. The labellum is as a rule the most conspicuous part, and is the most wonderfully constructed, as well as the most important, organ of the flower, since through it insects, when in search of the sweet juices stored inside the spur or walls of the flower, are attracted and guided to the nectar and thus accomplish the benefits of cross-fertilization. It is in this way that so many new varieties are produced by the unconscious work of insects, and these are termed "natural hybrids" and are collected and brought to us from tropical wilds. But under cultivation this important work must be done by experts, using delicate camel's-hair brushes, and with a most careful eye and judgment as to the proper time. It is in this manner that the most beautiful hybrids have been obtained, known as "garden hybrids."

Orchids are distributed over a large area of both the Eastern and Western hemispheres, and are divided into two general groups,—the East Indian and the South American. They are also classified according to their habit of growth and subsistence, as saprophytic, epiphytal and terrestrial. The first-named class includes the more inferior species, which grow mostly in wet and marshy places, and, commercially speaking, are of little value except for botanical purposes. The epiphytal group is by far the most valuable and most important of them all in every respect. The species of this section are often erroneously called "parasites," when it is a fact that not one of the whole orchid family is really a parasite. Nearly all the members of this class grow and thrive best upon the trunks and limbs of trees in raid air, simply clinging to a single stem or small limb, and, therefore, sometimes quite properly called air-plants. It is this group, too, which contains the most beautiful and most valuable species and varieties and the most varied colors. Their natural habitats are generally confined to

ORCHIDS.



2. *Odontoglossum*.



1. Lady's Slipper.



## ORCHID

tropical and subtropical climates in both hemispheres, where the moisture-laden and humid atmosphere affords the most congenial nourishment to these wonderful plants. Several epiphytal orchids are found in the extreme southern parts of the United States, some of which are highly interesting and fairly valuable.

The terrestrial orchids are such as grow upon the ground and, therefore, have no need of the pseudo-bulbs or terrated stems, which are peculiarly characteristic of the epiphytal section.

Of the other two classes, Saprophytes and Terrestrial, many varieties are indigenous throughout the United States, even as far north as Vermont and southern Canada. These are what are known as the hardy native varieties, which have their resting season during the winter months, while all the epiphytal (sometimes called celestial) orchids, which are found only in tropical climates, have their periods of rest during the dry season. Therefore the cultivator of these plants under glass must imitate nature as near as possible, giving them their season of rest after their new growth is finished, when water should be withheld gradually and only enough moisture applied to keep them alive until nature itself shows signs of fresh activity. This is the time the plants start in to develop and bring forth their flowers upon and from their previously matured and ripened growths or pseudo-bulbs, when moisture is again applied gradually, increasing the supply from day to day; and it is at this period that keen judgment must be exercised.

During the past ten or fifteen years orchids have become one of the most fashionable classes of plants—in fact no other flower has ranked so high in favor or is appreciated more to-day by the better and more highly cultured and æsthetic class of people both in Europe and America than is the orchid. From a commercial standpoint no flowers command the prices for floral decorations, both as plants in bloom and as cut flowers, equal to those of the many beautiful varieties of orchids which are now cultivated. Millions of dollars' worth of these plants are now in cultivation, both in commercial as well as in private collections, although 25 years ago very few practical gardeners knew much about their cultivation; previous to 1880 it was a rare treat to see even a few of the very ordinary varieties in bloom, and then usually only in private conservatories; scarcely any commercial collections existed. Every year the demand is increasing, and thousands of dollars' worth of these rare plants are imported annually from South American countries, the East Indies, the Philippines and even from Australia. To keep up the supply many practical and experienced collectors are sent out to these distant tropical countries to gather the plants, and the time is fast approaching when it will be almost impossible to collect any more plants within reasonable reach. In fact, so great has been the traffic that several South American governments have put an export duty upon the plants, while others have prohibited their further collection and exportation, entirely from fear of their total extinction.

This state of affairs has brought about the raising and cultivating of thousands of seedling orchids since 1895, and with it the crossing of

desirable species and varieties in order to obtain a better and improved class of plants and more beautiful types of flowers. But this is a very slow process, and great patience and many years of time and labor are required to bring them to flowering maturity and size. Carnations and other flowers can be raised in a single year, and even roses in two or three years, but it requires from five, ten or fifteen years to raise orchid plants fit for blooming purposes, so that we may never expect to see orchids in over abundance or a so-called drug on the market.

*Treatment and Culture.*—It is by no means as difficult a task to grow and cultivate these interesting plants as was supposed when orchids were first introduced to the public in this country during the year 1887, when a prominent florist, who practically is the pioneer in orchid culture, gave the first exhibition of these plants in mid winter in the city of New York. This was followed by annual exhibitions for several years, and people became interested in these wonderful plants. It was then thought next to impossible for anyone except an experienced gardener to manage them, and also that it would require specially constructed greenhouses; but many fine flowers have been produced by laymen in ordinary greenhouses—even in light and sunny windows many varieties thrive so well that thousands of people are cultivating orchids there. They, like other tropical and semi-tropical plants, require plain but careful treatment. They can be grown in ordinary flower-pots in a compost of a certain fibrous peat. The lower half of the pot is to be filled with potsherds and pieces of charcoal intermixed; then place the roots and rhizome of the plant in the peat, and fasten and pack it well. These plants can also be grown in earthen pans or wooden cribs, so that the plants may be thus suspended from the ceiling or in the windows. They require a continuous temperature of from 55 to 70° F., not lowered during the night. Water should be applied sparingly at first, when the plants start into growth, and gradually increased as the plants require it. Frequent spraying or syringing, especially during the spring and summer season, is highly beneficial. This should be done, however, in early morning or after 3 o'clock in the afternoon. In the winter or during their time of rest, when the recently made new growth is maturing, water must be given with judgment and only enough to keep them from shriveling.

Nearly all orchids delight in sunlight, but of course are not to be exposed to direct burning hot sunshine. A judicious shading is beneficial to their welfare. If such treatment is observed the plants, if healthy and thrifty to start with, will grow and flower as successfully as any other plants.

Following is a list of the most popular varieties of orchids named in the order of their commercial importance, with the countries from which they are obtained.

*Cattleya.*—The orchids of this genus undoubtedly rank as the most popular and most valuable among all orchids. They also contain more species and varieties than any other, and are confined entirely to South America, where they are known by their common name of "fleur de mayo," because the majority of these varieties produce their gorgeous flowers in the

## ORCHIS

month of May, generally the beginning of the wet season. Following are the principal named varieties:

*C. mossia*, *C. speciosissima*, *C. percevilliana*, and *C. laurerciana*, all of Venezuela; *C. labiata*, *C. warnerii*, *C. schroederii*, *C. harrissonii*, *C. intermedia*, *C. gaskelliana*, and *C. leopoldii*, each Brazilian, and several other kindred varieties; also *C. trianna* (and many varieties), *C. mendelii*, *C. gigas*, and varieties, all of the Andes or New Grenada; *C. maxima*, of Peru; *C. dowiana*, one of the most valuable and richly colored species, of Costa Rica; *C. citrina*, of Mexico; *C. skinnerii*, of Guatemala and Costa Rica; and *C. bournigiana*, of Honduras.

*Lelia*.—This genus is closely allied to *Catleya*, and includes the following species: *L. purpurata*, often called "queen of orchids," a native of Brazil; *L. elegans*, and its varieties; *L. harpophylla* and others, also of Brazil; *L. anceps* and its many varieties; *L. autumnalis*, *L. gouldiana*, *L. alba*, *L. albida*, *L. majollis*, *L. digbiana*, all of Mexico.

*Oncidium*.—This genus embraces many beautiful and valuable species and varieties, among which the following are most prominent: *O. varicosum* and *rogersii*, the golden butterfly orchid; *O. kramerii*, mottled butterfly; *O. sarcodes*, *O. macranthum*, *O. marshallianum* and many others, all of Brazil; *O. papilio*, the "butterfly" of the West Indies and South America; *O. splendidum* and *O. cavendishianum* of Mexico and Guatemala; *O. tigrinum* of Mexico, and many others.

*Odontoglossum*.—This genus includes some of the most beautiful and grandest orchids in existence, and the only difficulty is that up to the present time their successful cultivation under glass is still unsolved in this country, although they are very successfully grown in some sections of Europe, where they command a higher value than almost any other orchid. The most important varieties of this species are: *O. crispum*, *O. pescatora*, *O. albopurpurea*, *O. harryanum*, and kindred varieties, all of New Grenada or Colombia; *O. grande*, the "baby" orchid of Guatemala and Mexico; *O. citrosimum*, of Guatemala, and *O. inseylii leopardinum*, of Guatemala and the Pacific slope of Mexico.

*Peristeria*.—Flower of the Holy Ghost (*Peristeria elata*), of Central America.

*Lycasta*.—Several species of Guatemala and Mexico.

*Catasetum*.—These are South American and more interesting than beautiful, except *C. bungeothii*, which is ivory white and very fragrant.

*Stanhopia*.—A genus including one of the most curious of orchids, throwing its sweet-scented large flowers from the rhizome downward through its receptacle. Some six or seven varieties exist, natives of South and Central America.

*Chysis*.—Four or five species are found in Guatemala and Mexico, very curious plants and flowers, one of which is the "laughing orchid."

*Schomburgkia*.—A genus of very large and curious plants with great flowers. *Schomburgkia crispum* and *S. undulatum* are well known species of South America and the West Indies.

*Masdevallia*.—A very curious genus with numerous varieties, bearing highly interesting flowers.

*Epidendrum*.—A very large genus with many valuable and showy varieties, nearly all of which are highly epiphytal in character. Many of this group are not very desirable.

Of East Indian orchids, first in importance is the genus *Dendrobium*, a very large and valuable group, which includes a large number of species and varieties, all of which are found in the East Indies, Moulman, Assam and Burma, except two, found in Australia. The principal species are as follows: *D. nobilis* and its many sub-varieties; *D. wardianum*, *D. crassinoide*, *D. chrysotoxum*, *D. thyrsiflorum*, *D. densiflorum*, *D. devonianum*, *D. falconerii*, *D. farmerii*, *D. chrysanthum*, *D. dalhousieanum*, *D. formosum*, and many others of less importance, except *D. bigibbum* and *D. phalenopsis* of Australia.

*Phalenopsis*.—A genus of East Indian species called moth-orchids. This is one of the very rarest and most valuable genera and also the most difficult group to cultivate successfully, but their beautiful and really fantastic miniature bird-like flowers render them very desirable. Most of them are natives of and found in the Philippine Archipelago, and in Burma and Siam. Following are the most valuable varieties: *P. amabilis*, *P. grandiflora*, *P. schillerianum*, *P. sanderianum*, *P. luddemanniana*, *P. casta*, *P. stuartianum*, *P. violacea*.

*Vanda*.—This genus represents the tribe or order of *Vandaceae*, which includes the *Ærides*, *Saccolabium*, and *Angraecum*. Prominent species are *Vanda cœrulea*, *V. tricolor* and its varieties; *V. insigne*, *V. lowii*, *V. batemanii*, *V. cathcartii*, *V. sanderiana*, *V. ieres*, *V. kimbaliana*, *V. amesiana*; *Ærides odorata*, *A. fieldingii*, *A. lobbiai*, *A. virens* and many others; *Angraecum sesquipedale*, *A. eburneum-virens*, *A. articulatum*, *A. ellisii* and *A. leonii*; *Saccolabium giganteum*, *S. blumci*, *S. guttatum*, *S. ampulaceum* and others. Other semi-terrestrial forms are *Calanthe veitchii*, *C. vestita* (varieties *occulata* and *rubra*), *A. turnerii*, *A. regnicrii*, *A. gigantea* and a few other hybrids; *Cymbidium lowianum*, *C. eburneum*, *C. giganteum*, and *C. mastersii*; *Calogyne cristata*, *C. alba* (rare), *C. lemoniana*, *C. flaccida*, *C. dayana*, and *C. pandurata*; *Phajus grandiflora*, *P. tuberculosa*, *P. wallichii*, *P. maculatus* and *P. humboldtii*.

*Cypripedium*.—This genus, embracing the ladies' slipper, or slipper orchids, is the most important group of terrestrial orchids, and includes a vast number of species from which have been raised a greater number of rare hybrid varieties than from any other class. While not as showy as many of other genera they are highly interesting to the hybridist, and from this standpoint are very valuable. Sometimes a single small plant of a new hybrid will sell for \$500.

HENRY A. SIEBRECHT.

**Orchis**, the typical genus of the order *Orchidaceæ*. The roots of several species, as those of the *O. mascula* and *O. morio*, when dried, form the European or indigenous salep. That prepared from the first-named species is said to be the best. Salep contains the principle called bassorin and a little starch, possessing similar properties to those of starchy and mucilaginous substances generally.

**Or'chil.** See **ARCHIL**.

**Orchomenus**, òr-kom'è-nūs, Greece, (1) an ancient Boeotian city, capital of the kingdom of the Minyæ, situated at the northwestern corner of Lake Copais (now Topolia) where it is joined by the Cephissus. The town extended from the marshy edges of the lake up the face of a steep rock hill, on which stood the acropolis. It sent 30 ships to the Trojan war, and at a later date became a member of the Boeotian confederacy. Its government was thoroughly aristocratic, and after the Peloponnesian war the jealous democratic Thebans destroyed it by fire, and sold its inhabitants as slaves. It was rebuilt in the reign of Philip of Macedon, but never recovered its position. It was famous for its musical festival in honor of the Graces, who were specially worshipped in the city. In 1880 Schliemann excavated there a royal tomb or mausoleum, larger than the "Treasury of Atreus" at Mycenæ (q.v.). (2) a former city in Arcadia north of Tripolitza, on a hill dominating the road to the north. During the wars of the Macedonians and Achæans it was a fortified post of considerable strategic value.

**Orcin**, òr'sîn, in chemistry, also called orcinol,  $C_8H_6O_2$ . It exists ready formed in some of the lichens which produce colorless matters themselves, but which yield coloring substances by reaction with water, ammonia or air. Orcin is also prepared artificially from orsellic acid by boiling in water,  $C_8H_6O_4 = C_8H_6O_2$  (orcin) +  $CO_2$ . On evaporation the orcin crystallizes in the form of colorless, six-sided, monoclinic prisms, which are soluble in water, alcohol, and ether, and have a nauseous sweet taste, but no odor. In the hydrated state it melts at  $58^\circ C.$ , and in the anhydrous state at  $108^\circ C.$  It is a di-oxy-toluene represented by the formula  $C_6H_3(CH_3)(OH)_2$ . It yields rhombic crystals and forms substitution products with bromine, chlorine and iodine. Orcin gradually turns red on exposure to the air.

**Orcus**, òr'kūs, the Latin name for Pluto, hades, or the infernal regions. See **PLUTO**.

**Or'cutt, William Dana**, American author: b. West Lebanon, N. H., 18 April 1870. He is general manager of the University Press, Cambridge, Mass., and has published 'Good Old Dorchester,' a narrative town history (1893); 'Princess Kallisto' (1903); 'Robert Cavalier: the Story of the Romance of the Sieur de La Salle' (1904).

**Ord, òrd, Edward Otho Cresap**, American soldier: b. Cumberland, Md., 18 Oct. 1818; d. Havana, Cuba, 22 July 1883. He was graduated from West Point in 1839 and served in Florida and in California until the outbreak of the Civil War when he was promoted brigadier-general of volunteers and assigned to a command in the Army of the Potomac. In 1862 he was made major-general and transferred to a command under General Halleck and distinguished himself under Grant at Corinth. He was present at the capture of Vicksburg and in 1865 was appointed to the command of the Army of the James and the Department of Virginia with which he was present at the capture of Richmond. Subsequently he was given charge of the Department of the Ohio and in 1866 he was mustered out of the volunteer service. He remained in the Regular Army in command of the

Departments of Arkansas, California, Platte, and Texas successively and in 1881 was retired with the rank of major-general.

**Or'deal**, certain acts which a person suspected of crime was made to perform solemnly and which would in the ordinary course of things be hurtful or fatal to him; if, however, he performed them without being injured, he was declared to be innocent. These tests were called ordeals or judgments of God. As the results of them often depended on those who made the preparations, there was abundant opportunity for deceit and malice.

The following ordeals were anciently in vogue throughout Europe: The duel or wager of battle (see **COMBAT**), in which the conquered was held guilty; the ordeal of fire; of water; the corsned; the trial of the eucharist; the test of the cross; and the judgment of the bier. In the ordeal of fire the accused walked barefooted over coals of fire, or over red-hot plowshares; or had to carry a red-hot iron in his hand; or was made to walk through fire, in the last case he was dressed in cloth covered with wax (the trial of the waxen shirt); if he was unhurt by the fire, and the wax unmelted, he was considered innocent. In the trial by cold water (often applied to witches) the test would be whether the accused sank or floated; if the latter, he (or she) was guilty; or the suspected party had to put his hand into boiling water and lift something out. In the corsned trial a priest put the corsned, or hallowed bread, into the mouth of the accused, with various imprecations. If the accused swallowed it he was freed from punishment. The test of the eucharist was applied chiefly among the clergy and monks. When they took the host it was believed that God would smite the guilty with sickness or death. In the trial of the cross, the accuser and the accused were placed under the cross with their arms extended or cross-wise, and who first moved his hands or suffered them to fall was held to be guilty. Or the accused was placed before relics, and two dice were then produced, one marked with a cross. Of these one was taken up at hazard. If it happened to bear the sign of the cross the accused was acquitted. Finally the judgment of the bier was used in the trial of murder; the murdered person was placed upon a bier and the accused made to touch the body. If blood flowed out, or foam appeared at the mouth, or the dead body changed its position, the suspected person was considered guilty. Superstition and artifice gave to these ceremonies the highest authority; and even the emperors were unable to abolish them. The papal chair restrained them by improving the judicial system; after the 14th century ordeals became uncommon, and in the 15th they were superseded by the canon law, which invented the oath of purgation, by which the accused was acquitted on a solemn declaration of his innocence. The universal use of the Roman law also tended to abolish trial by ordeal. In the 16th century only the trial of the bier survived, and this continued even to the 18th. Besides this ordeal of cold water for sorcery (found in Prussia in the 17th century and in the neighboring countries in the first half of the 18th), witches were weighed, and if found to be light they were pronounced guilty. These foolish customs were gradually



## ORDER—ORDERS IN ARCHITECTURE

done away, when Thomasius (see THOMASIIUS, CHRISTIAN), succeeding in almost wholly annihilating the belief in witches. Yet as late as 1728 witches were weighed at Szegegin in Hungary. Roman law substituted in their place an equally cruel process, namely the torture. Ordeals are still found among all the negro nations north of the Zambesi. When a man suspects that any of his wives have bewitched him, he sends for the witch doctor who makes an infusion of the plant called *goko*. His wives all drink it, each one holding up her hand to heaven, in attestation of her innocence. Those who vomit it are considered innocent, while those whom it purges are pronounced guilty and burned to death.

Some negroes on the coast of Guinea put into the hands of the accused herbs and barks of a peculiar character and suppose they have the property of burning the guilty. Ordeals of various kinds, but chiefly the trials by fire and by water, are found among the Chinese, the natives of Pegu, of Kongo, of the coast of Guinea, and the tribes of Asiatic Russia. In Senegambia an application of red-hot iron is made to the tongue of the supposed criminal. In Siam the accuser and the accused were placed together in one spot, and a tiger was let loose upon them. If one was spared, he was considered innocent; if both were destroyed, they were both deemed guilty; and if both were spared, they were compelled to undergo some more certain test. In eastern Africa, among the Wanaka tribe, are the ordeals of the hatchet, of the copper kettle, of the needle, and of the piece of bread. The first two were analogous to the hot iron ordeal and the last to the corned of Europe. In the ordeal of the needle, a red-hot needle was drawn through the lips of the alleged criminal, and if blood flowed from the wound, he was deemed guilty; but if none, innocent. In Madagascar the trial by ordeal is still generally practised by legal authority. The supposed criminal is made to drink a decoction of a poisonous fruit called the *tangena*, a small dose of which acts as an emetic, while a large dose is fatal. By managing the size of the dose, those who administer it can decide the result.

**Or'der**, in zoology, a division in classification greater than a family and less than a class. It is based upon broad criteria of structure. The principal orders in the animal kingdom are enumerated in the Table of Classification in the article ANATOMY, COMPARATIVE.

**Order of B'nai B'rith.** See B'NAI B'RITH.

**Order, Brith A'braham**, an American benevolent and fraternal society organized in 1850. In 1910 it had a grand lodge, 365 sublodges and 69,489 members. The benefits disbursed amount to about \$160,000 per annum.

**Order of Bucks.** See ODD FELLOW.

**Order of Independent Odd Fellows.** See ODD FELLOW.

**Order of Preachers.** See DOMINICANS.

**Order of Saint John of God.** See ORDERS, RELIGIOUS.

**Order of Saint Joseph.** See ORDERS, RELIGIOUS.

**Order of the Snare of Love.** See ORDERS, ROYAL.

**Order of Solomon's Seals.** See ORDERS, ROYAL, Abyssinia.

**Order of United American Mechanics.** See UNITED AMERICAN MECHANICS, ORDER OF.

**Orders in Architecture**, the different styles of classic architecture as distinguished by the character of the column, its base, shaft, capital and the superimposed entablature. These elements constituting the unit of a colonnade are taken account of in distinguishing the various orders, of which there are five, the Doric, Ionic, Corinthian, Tuscan and Composite. Each type of the column seems to have persisted in its main characteristics from the earliest times while undergoing minor modifications in the way of refinement in proportions and details.

The column of the Doric order presents a tapering shaft resting upon the stylobate or platform. The shaft generally consisted of several parts called drums but in rare instances it was monolithic. It was grooved with semi-elliptical channels meeting in a sharp edge or arris. Surmounting the shaft the capital consisted of a circular cushion or echinus, so named from the sea-egg from which its curve was derived, and a square flat stone called the abacus. The capital formed the support for the entablature, comprising the architrave, frieze, and the cornice. The architrave or epistyle was the first series of horizontal stones, usually unornamented, and forming a solid basis for the frieze above, which was divided by alternating parts called triglyphs and metopes. The triglyphs were blocks, slightly projecting, carved with two vertical grooves and chamfered edges. These, save the two end ones, were placed above the centre of the columns and in the space midway between. The metopes were intervening square panels, often carved with architectural sculpture. Resting on the frieze was the cornice, consisting of a series of projecting moldings, the under side of the bed-molding being ornamented with square mutules having each eighteen guttæ depending from its under side. The gutter molding above protected the sculptured metopes from water.

The Ionic order, a development of the 5th century B.C., was characterized by greater slenderness of proportion. The shaft was placed upon a base composed of one concave and two convex moldings of semicircular profile; these in turn sometimes rested upon a square base block or plinth. The fluting of the shaft was semicircular, consequently deeper than the Doric, and was separated by fillets. The capital comprised a bead, an echinus, and an upper and characteristic band ending on both sides in a volute or scroll. The entablature was formed by an architrave of two or three flat faces and a frieze without triglyphs. The superimposed moldings introduced a new feature in the row of narrow blocks or dentals under the corona.

The Corinthian order was a late development of the Ionic, resembling it in base and shaft, but differing in the form of the capital, which was ornamented with circlets of acanthus leaves surmounted by branching scrolls meeting at the corners in spiral volutes.

These three orders were invented by the Greeks, but were appropriated by the Romans who modified them in certain unessential details into types that pass as Roman Doric, Roman Ionic and Roman Corinthian. The latter,

## ORDERS IN COUNCIL—ORDERS, RELIGIOUS

however, was the favorite order of Roman architecture. To the Romans belong, in addition, two other orders; the Tuscan, resembling the Doric, but without flutings in the column or triglyphs in the cornice; and the Composite, whose capital consisted of volutes modified from the Ionic and a lower circle of acanthus leaves derived from the Corinthian. This order admitted a great variety of ornamentation.

**Orders in Council,** orders issued by the English sovereign in accordance with the advice of the Privy Council, a body which has no legislative power, excepting so far as Parliament may grant it. In times of emergency, however, the Privy Council has issued orders of a legislative character. Those who were instrumental in issuing such orders or carried them out are generally relieved from all liability by a subsequent act of indemnity. It was by orders in council that Napoleon's famous Continental System was met. See CONTINENTAL SYSTEM; BERLIN DECREE.

**Orders, Holy.** See HOLY ORDERS.

**Orders, Religious.** The primary conception upon which the theory of the monastic life is based is an extremely old one, the belief that it was possible for man to perfect his moral nature and to attain the highest degree of spirituality by resorting to austere discipline and bodily mortification having been common among both Jews and Pagans long before the beginning of the Christian era. In fact, one has but to turn to the Essenes, the Stoics, or the Therapeutæ to find the germ of thought that was not only to inspire the asceticism of the early Christian times, but that was to grow and expand into the more purposeful religious orders of our own day; for the ascetics, with their macerations of the flesh, and the anchorites, or hermits, who retired from the world to strive to find spiritual strength in desert places, were the forceful influences in religious life, the examples of spiritual contemplation, without which the great monastic orders could scarcely have been instituted. The first ascetics as a rule did not separate themselves from the world, but sought to find the spiritual perfection to which they aspired by means of prayer and mortification of the flesh, not by withdrawing from the company of men; and even when, in the 3d century, the more zealous Christians were driven by persecution to find a place of refuge in the desert, they lived apart, in separate cells, such an idea as that of a common life or community of interests being entirely foreign to their purpose. It was Saint Anthony who first gathered a class of disciples about his feet that he might teach them, from his own wisdom and experience, how best to attain the spiritual heights upon which their longing eyes were set, and yet Saint Anthony formulated no hide-bound rule of life and announced no principles that would lead one to imagine that he had thought of uniting his individual disciples into a formal congregation. Saint Pachomius, who about 315 A.D. built his first monastery in the Thebaid, had only a vague idea of the value of the community life, and not the least conception of the possibilities for which he was so firmly laying the foundation, the religious orders of the Middle Ages that were at last to become such a powerful influence in the evangelistic work of the world.

Although the rule of Saint Benedict was practically the only one that had been adopted at the beginning of the 10th century, the monasteries up to that time had been under the control of bishops. In the 10th century, however, several separate communities formed themselves into congregations under the direction of a common superior, and it was then only that the word "order" could be properly applied to any of the monastic institutions. This rule of Saint Benedict, which remained the popular monastic rule for centuries, provided a year's probation for novices, and bound each member after that period to constant residence within the monastery, unconditional surrender to the superior, canonical prayer, regular labor, and lives of chastity and complete renunciation of the pleasures of the world. The rule of Saint Augustine, another formula for the religious life which was quite widely adopted during the early centuries, was at first intended exclusively for the clergy and was not adapted for the use of the monks, who were then reckoned among the laity. It was not until the 8th century, therefore, when monks came to be regarded as entitled to clerical rank, that it was assumed by other than the regular clergy. The desire to give more austerity to the religious life, a movement which began to be noticeable in the 11th century, resulted in the establishment of several new orders. In almost each instance, while the rule of Saint Benedict was adopted, it was made more strict by special statutes, and to those who aspired to great asceticism life in these congregations appealed strongly. On the other hand, institutions like that of the Trinitarians, the Order of Grace, and others that mingled more freely with the world, were adopted by those who felt drawn to lives of action rather than to silent contemplation. To the mendicant orders, which appeared at about this time, many special immunities and privileges were given, and these were exercised everywhere without regard to parochial rights or jurisdictions.

From the beginning of the 10th century the multiplication of these religious associations of men bound together by vows to live devotional lives separated from the world, has been almost continuous. Local prescriptions, like the Reformation in England, Germany and other parts of Europe, the Revolution and the later "Law of Associations" in France, the attacks of the Liberals in Spain, and other forms of suppression have, from time to time, driven certain orders into extinction, but reorganization and rejuvenation, as well as the institution of new orders upon more modern rules of life, have tended to obliterate nearly all traces of the damage done by the passage and enforcement of such unfriendly statutes. The most numerous bodies of monks, of course, are those of the Roman Catholic Church. In the Eastern Church nearly all the orders follow the rule of Saint Basil, while the monastic orders in the Church of England or the Protestant Episcopal Church in the United States have either adapted old rules of living to their own use or have formulated rules suitable to themselves. In the Roman Catholic Church, however, monastic orders of men or women have been founded for almost every purpose.

The following is a list of male orders and congregations that have attained any great degree of prominence in the religious world:

## ORDERS, RELIGIOUS

### ORDERS OF MEN.

**Alexian Brothers.**—A pious society founded in the beginning of the 14th century by one who is simply known as "Tobias." The end of the order is twofold: The sanctification of the Brothers, and the active exercise of charity toward the neighbor. (See **CELLITES**.)

**Atonement, Society of the.**—A religious order for the clergy and laymen of the Protestant Episcopal Church. Its objects are educational and charitable.

**Antonines.**—An order of monks founded by Gaston, a gentleman of Dauphine, in the 11th century, for the purpose of serving those who were attacked by a mysterious disease known as Saint Anthony's fire. The order, the members of which lived under the rule of Saint Austin, flourished until the Revolution.

**Augustinians.**—An order founded in Africa, in the 4th century, by Saint Augustine. It is devoted chiefly to intellectual and missionary works in America and Asia. In 1526 the various brotherhoods were united by Pope Alexander IV. (See **AUGUSTINIANS**.)

**Baccanarists, or Regular Clerks of the Faith of Jesus.**—A congregation founded by Baccanari, a native of the Trentino, at the end of the 18th century, for the purpose of reviving the suppressed Society of Jesus under another name. In addition to wearing the Jesuit habit and making the Jesuit vows, the members added a fourth vow of unconditional obedience to the Pope. In 1814, the Jesuits having been restored, the new order was absorbed into the Society of Jesus.

**Barefooted Friars.** (See **TRINITARIANS**.)

**Barnabites, or Regular Clerks of the Congregation of Saint Paul.**—An order founded in 1533, by Saint Antonio Maria Zaccaria, for the purpose of combating the evil tendencies of the age by the organization of a congregation of secular clergy who should not retire from the world, but who should live in it and work for it, and diligently attend to their own sanctification while preaching reformation to others. Besides the usual three vows, its members took a fourth: Never to seek office or ecclesiastical dignity, nor to accept any post outside of their order, without the permission of the Pope. With headquarters at Rome it has colleges in various parts of Europe.

**Bartholomites.**—A religious order suppressed by Pope Innocent X., in 1650.

**Basilians.**—An order taking its name from Saint Basil, bishop of Caesarea in Cappadocia. (See **BASILIAN**.)

**Beghards.**—An association of laymen living together without perpetual vows. Organized in the 13th century they existed until 1650, when they were suppressed by Pope Innocent X.

**Benedictines.**—An order established at Subiaco, in the 6th century, by Saint Benedict, the patriarch of monks in the West. (See **BENEDICTINES**.)

**Bernardines, or White Monks.**—A particularly strict order of Cistercians instituted by Saint Bernard of Clairvaux, about 1115.

**Bethlehemites.**—An order established by Peter of Betancourt at Guatemala, in the 17th century. Its purpose is to attend the sick and teach in the schools of which it now possesses some 40, including hospitals, convents, and educational institutions. In 1867 Pope Innocent XI. placed them under the rule of Saint Augustine.

**Black Friars.** (See **DOMINICANS**.)

**Blessed Sacrament, Congregation of the.**—Founded by Pierre Julien Eymard, in 1856, as an effort to accentuate the honor paid to the Holy Eucharist, by the perpetual exposition and adoration of the Sacrament. The order has extended to all parts of the world.

**Boni Homines.**—Several monastic orders have borne this name: (1) An order founded by Saint Stephen Grandmont; (2) The Minims in France; (3) A Portuguese Order of Canons, founded by John Vicenza, Bishop of Lamego, in the 15th century; (4) An order bearing this appellation existed in London in the 13th century.

**Brigitines, or The Order of the Saviour.**—Founded by Saint Bridget, about 1344, upon a constitution said to have been communicated by divine revelation. Its rule was that of Saint Austin. It is still represented throughout the European countries.

**Casarians.**—The adherent of Caesar of Spire, a German friar of the order of Saint Francis who made himself conspicuous by opposing the attempt to relax the rules of the order. After 1256, however, when Saint Bonaventure became general, there was no excuse for the existence of the Casarian faction, and it died a natural death.

**Camaldoli.**—An austere order founded by Saint Romuald, in 1012. Its members, who wore a white habit, were obliged to fast during two Lenten in the year; at other times to abstain from meat, and to live, at least three days in the week, on bread and water. In 1102, Rudolph, the fourth general, prepared the

first constitution of the order, slightly mitigating the severity of the original rule. Although practically unknown in other countries it still exists in Italy.

**Calvarines.**—The Congregation of Calvarines, which was founded by Hubert Charpentier, a priest of the diocese of Auch, in 1635, ceased to exist during the Revolution. Its purpose was to honor the Passion of Jesus Christ and to labor for the promotion of Catholicism.

**Capuchins.**—The shape of a cowl was the bone of contention that at one time threatened the stability of the Franciscan order and that finally resulted in the institution of the order of Capuchins. The reformer was Matteo di Bassi of Urbino, an Observantine friar, who, becoming convinced that the cowl worn by the friars of that day was not the cowl prescribed by Saint Francis, not only adopted a *capuche* of different shape, but, in 1526, obtained permission of Pope Clement VII. for himself and his companions to wear this habit and also to adopt the life of hermits, preaching the gospel in all lands, under the provision that they should present themselves annually at a general chapter of the Observantines. Matteo began his preaching, and was so successful in arousing public interest that the provincial of his order had him arrested for apostasy. He was released from prison through the intervention of relatives of the Pope, and, shortly afterward (1528) a bull was obtained which authorized the union between the reformers and the Conventual branch of the Franciscans, allowed them to adopt the hermit life, sanctioned the wearing of beards, and permitted the use of the long-pointed cowl. From that day the growth of the order was rapid. Although still subject to the Conventuals, and under the rule of a vicar-general, the order in 1859 adopted separate statutes in which all the hours for religious service, for mental prayer, for silence, for taking the discipline, etc., were clearly prescribed. It was also stipulated that the order should have no revenues, but should live by begging, and everything about its churches and convents should be as poor and mean as possible. As to food, the friars were permitted to eat one kind of meat a day and wine was not forbidden, but it was specified that nothing should be said to discourage any member who might desire to diet himself more rigorously. Under this rule the order has produced many men eminent for their eloquence, their learning, or their Christian virtue, one of the most illustrious being Saint Fidelis of Sigmaringen, who was martyred in 1622. Strangely enough, however, the founder Matteo resigned from the order because the Pope had decreed that Capuchins who did not remain in their monasteries should be permitted to wear the long cowl. In 1617 the Capuchins were made exempt from obedience to the Conventuals, and, under its present title, the order withstood the Revolution and other similar movements, and is widely represented to-day.

**Carmelites.**—Founded in the middle of the 12th century by a crusader named Berthold who vowed to embrace the religious life if God would make his side victorious in battle. (See **CARMELITES**.)

**Carthusians.**—The order of Carthusians was founded in the 11th century by Saint Bruno of Cologne, who resigned his position as scholasticus of the school of Rheims in order that he might retire from the world. The foundation of the new order was erected at Chartreuse, an upland valley, in the Alps, more than 4,000 feet above the sea. Although almost unapproachable, being surrounded on all sides by high crags, and while the soil was poor, the temperature low and the air charged with fog at almost all times, the site was gladly accepted, and here Bruno and his companions built their mother house, after the form adopted by the ancient Lauras of Palestine. In 1089 Bruno was summoned to Rome by Pope Urban II., who had been one of his pupils, and he never returned to Chartreuse, spending the remainder of his life in founding convents and promoting the interests of his order. Although it was many years before any statutes were framed for the Carthusians, and while the complete code was not arranged and approved by the Holy See until the latter part of the 17th century, the writings of Peter the Venerable, abbot of Cluny, prove that their life was one of great austerity even without a written rule. "Their dress," he says, "is meaner and poorer than that of other monks; so short and scanty and so rough, that the very sight affrights one. They wear coarse hair shirts next their skin and fast almost perpetually. Their constant occupation is praying, reading, and manual labor, which consists chiefly in transcribing books. In spite of this rule, a rule so strict that the Church permits members of other mendicant orders to exchange their vows for those of the Carthusians while the Carthusian can pass to no other order, the success of its members in their search for the perfect life has been marked by great success." Since 1508, in accordance with the decree of Pope Ju-

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lius II., the Carthusian monasteries in every part of the world have been under obedience to the prior of the Grand Chartreuse and the chapter-general of the order.

**Celestinian Hermits.**—An austere branch of the Franciscans that ceased to exist early in the 14th century.

**Celestinians.**—Before the elevation of Celestine V. to the pontificate, 1294, and when he was known merely as Peter of Morone, he founded an austere order which afterward took his pontifical title as its name. In spite of its strict rule of life, which provided for perpetual abstinence from meat and frequent fasting, the membership increased rapidly, and the order, which extended into almost every part of Europe except England, enjoyed great prosperity until it was suppressed, in Germany by the Reformation, and in France by the revolutionary commission of 1766. At present the order exists only in Italy.

**Charity, Brothers of.**—The congregation of the Brothers of Charity, of Saint Vincent de Paul, was founded in Belgium, about 1809, by Rev. I. Triest, canon of Saint Bavon, Ghent. Founded for the purpose of procuring the sanctification of its members by the practice of the three simple vows and the observation of its constitution, its special object is the ministry of charity. This ministry, which the congregation exercises in its several establishments, consists chiefly in maintaining and ministering to the aged, the sick and the insane; in sheltering poor workmen; in educating children of all classes, but principally the poor, the orphan, juvenile offenders, and the deaf, dumb, and blind, and by performing any other work of charity to which they may be called.

**Charity, Fathers of the Institute of.** (See ROSMINIANS.)

**Chartreux.** (See CARTHUSIANS.)

**Christian Instruction, Brothers of the.**—This institute, which has for its purpose the Christian education and instruction of youth, was founded at Saint Briec, France, by Abbé John Mary de la Mennais. In 1891 it was approved by the Holy See.

**Christian Brothers.** (See BROTHERS OF THE CHRISTIAN SCHOOLS.)

**Christian Brothers, Irish.**—A religious congregation founded at Waterford, Ireland, in 1802, by Edmond Ignatius Rice, for the purpose of improving the education of the poor who were unable, under the penal laws, to procure Catholic education. The rules and system adopted were those of the institute founded by De la Salle, and the first school was opened at Mount Sion, in Waterford, 1 May 1804. The success of this venture was so great that similar establishments were opened in Dublin, Limerick, and other cities, and the results were so satisfactory that on 5 Sept. 1820, Pope Pius VII., acting upon the memorial of the bishops of Ireland, confirmed the institute and granted it a constitution. At the time of the establishment of the system of national education, in 1831, the Brothers placed their schools under the direction of the Board, but when it was found that its rules regarding the absolute separation of secular and religious teaching were tending to lead them from the spirit under which they had been founded, they withdrew their connection with the Government and have since conducted their schools as an independent institute under the protection of the Church. The Brothers are bound by the usual religious vows and are under the direction of a superior-general.

**Christian Schools, Brothers of the.**—An educational institute founded by Abbé J. B. de la Salle in the 17th century. (See BROTHERS OF THE CHRISTIAN SCHOOLS.)

**Christian Doctrine, Fathers of the Congregation of.**—The Congregation of the Christian Doctrine is the outgrowth of a society which was founded by Marco Cusani for the purpose of adopting more systematic methods in the teaching of the doctrines of the Church. When organized in 1560, the membership was composed of a number of priests and laymen who confined their efforts to teaching the catechism to children on Sundays and to the ignorant peasantry on Church holidays and such other times as it was possible to reach them, but the influence of the association was so strongly for good that it attracted the attention and approbation of Saint Pius V. Both Clement VIII., in 1596, and Urban VIII., in 1627, made the confraternity the object of their favor, the latter issuing an order providing that members leaving the community should incur the penalty of apostasy, as if monks. Pope Paul V. made the society an archconfraternity, and as such it remained until modern times, when it assumed the title of Congregation.

**Cistercians.**—The order of Cîteaux, founded in 1098 by Saint Robert as an offshoot from the Benedictines, eventually became one of the most flourishing and illustrious of all the orders of the Church, but is now so nearly extinct that but few traces remain, the storms of the Reformation and Revolution leaving few of

its convents in Europe. The order was founded in 1098 in the desert at Cîteaux, near Dijon, by Saint Robert, who had gathered some twenty zealous hermits about him. Together they entered upon a most austere rule of life, for never was the rule of Saint Benedict followed more rigorously. There was fasting from 14 September until Easter, little sleep and much hard labor, with prayer and religious contemplation as the only relaxation. This was Saint Robert's ideal of the religious life, but he was not permitted to follow it for long, being commanded by the Pope to return to Molesme, his former charge. He obeyed the order promptly, leaving Alberic as his successor at Cîteaux, and it was he who drew up the first statutes of the order, and who changed the color of the habit from brown to white. During more modern times there have been several reforms of the order, the most celebrated being that which was instituted at La Trappe. (See TRAPPISTS.)

**Cluny, Congregation of.**—The Congregation of Cluny is another offshoot from the Benedictine order which attained influence and greatness during the Middle Ages only to meet with extinction later. Founded in 912 by Saint Benno, abbot of Gigny, the order soon attained great wealth and political influence, the succession of great and saintly men who were associated with its work being sufficient to make its reputation widespread. Among these were Saint Mayeul, Saint Odilo, Saint Hugh, Pope Urban II., who preached the first crusade, Peter the Venerable, and many others.

**Common Life, Clerks and Brothers of the.**—An institute founded by Gerhard Groot, a deacon of Deventer, in 1384, for the purpose of providing a home for men who desired to live an austere Christian life in common without taking perpetual vows. The influence of the first house, instituted at Deventer, was quickly recognized by church authorities, and other houses were founded throughout the Netherlands and in Germany, and it was from these institutions that many good and wise men went forth to preach and teach, Thomas à Kempis and Nicholas of Cusa being among the number.

**Conventuals.** (See FRANCISCANS.)

**Cordeliers.** (See FRANCISCANS.)

**Crutched Friars.**—The Crutched or Crossed Friars are sometimes regarded as a branch of the Trinitarian stock, but by others it is claimed that they were a separate order founded by a prior of Saint Mary's, at Bologna, about the middle of the 12th century.

**Discalced Trinitarians.** (See TRINITARIANS.)

**Divine Word.**—The Society of the Divine Word was founded by Rev. Arnoldus Janssen in 1875. Its object is the promotion of missionary work among the heathen and the education of youth of all races.

**Dominicans, or Order of Preachers.**—An order founded in the 13th century by Saint Dominic. (See DOMINICANS.)

**Eudists.**—A congregation of secular priests founded by Père Eudes of Normandy, in 1601. Established under the names of Jesus and Mary, the congregation had for its object the training of the clergy and the giving of missions. The Eudists make no vows and wear the ordinary dress of the secular clergy.

**Eustathians.**—A congregation of fanatical monks suppressed by the Council of Gangra.

**Feuillants.** (See CISTERCIANS.)

**Franciscans.**—The order founded by Saint Francis of Assisi in the early part of the 13th century. (See FRANCISCANS.)

**Fratricelli, or Little Brethren.**—Originally a strict branch of the Cistercian order it began to assume sectarian characteristics, for which it was condemned by papal bull in 1317. It somewhat resembled the Brethren of the Free Spirit.

**Friars Minor.** (See STRICT OBSERVANCE.)

**Gilbertine.** (See SEMPRINGHAM.)

**Grandmontines.**—A monastic order established in Limousin, France, by Stephen, a gentleman of Auvergne, about 1076. Now extinct.

**Grey Friars.** (See FRANCISCANS.)

**Holy Cross, Congregation of the.**—The Congregation of the Holy Cross was founded in Le Mans, France, 1793, by Rev. James F. Dujarie. Its object was the rehabilitation of the Christian schools then almost destroyed by the Revolution. At first it was composed only of Brothers, but, in 1837, candidates for the priesthood were admitted under the Reverend B. Moreau, who became the first superior-general. The Congregation received the approval of the Holy See 13 May 1857, as a religious society of priests and brothers, devoting their lives to educational work in universities, colleges, and schools, and missionary work at home and in foreign countries. The Congregation was introduced into the United States in 1841 when the Reverend E. Sorin, afterward to become the head of the society throughout the world, established a college in the primeval forest of northern Indiana and called the place Notre Dame. From this humble beginning grew the University of Notre Dame, one of the largest and most

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advanced Roman Catholic educational institutions in America. The original band of 11 has developed into a community of 275 priests and brothers, conducting colleges in various parts of the United States and Canada. Its members also have charge of large missions in India, and the Congregation is noted for its progressive spirit and the zealous work and scholarly attainments of its members.

*Holy Cross of Westminster, Order of the.*—A religious order for priests and laymen of the Protestant Episcopal Church. It was founded in New York city in 1881, but was removed to Westminster, Md., in 1892. Its objects are the cultivation of the spiritual life of its members, and the performance of good works, especially those connected with missions, retreats, etc.

*Holy Ghost, Congregation of the.*—The Congregation of the Holy Ghost, otherwise known as the Missioners of the Immaculate Heart of Mary, is the result of the union, in 1848, of these two societies. The Congregation of the Holy Ghost had been founded in Paris in 1703, by Claude Desplaces, a Breton, while the Missioners were organized by Francis M. P. Liebermann, about 1841. Finding that the two organizations were working along practically similar lines, it was decided to effect a fusion, the rule of the Fathers of the Holy Ghost, which had already been confirmed at Rome, being retained, while the constitution adopted should be that of the Missioners. Its objects remained the same: The perfection of its members and the evangelization of the blacks, especially the negroes of Africa. Since 1848 many educational institutions have been founded, and all have been conducted with skill and ability, the most important being the French Seminary at Rome. The society is governed by a superior-general elected for life, while the missions are conducted under the direction of bishops or vicars-apostolic chosen from the general body. Members take the three ordinary vows of religion, and bind themselves to the Congregation, first temporarily, but afterward perpetually.

*Holy Infancy, Brothers of the.*—The Brothers of the Holy Infancy consecrate themselves to the care of children, the education of the young and the reformation of juvenile criminals. They direct a Roman Catholic Protectory at West Seneca, N. Y.

*Holy Saviour, Companions of the.*—A congregation in the Protestant Episcopal Church established for clergymen and such laymen as may be preparing for holy orders. Its members pledge themselves that, while in the congregation, they will keep a simple rule of prayer, meditation and study in divine things.

*Immaculate Conception, Regular Canons of the.*—Its object is the education of the clergy for parish work as well as the education of seminarians, and yet with many houses in Europe and 16 in Canada, the institute is not represented in the United States.

*Jeronymites.*—During the Middle Ages a number of men followed the example of Saint Jerome, who spent four years in solitude in the Syrian desert. They were known as the Hermits of Saint Jerome, or Jeronymites, and, of these four distinct congregations are mentioned by monastic historians: (1) The Disciples of the Blessed Thomas of Sienna; (2) The Hermits of the Observance; (3) the Hermits of the Blessed Peter of Pisa, and (4) the Hermits of Piesole. No Jeronymite convents exist at the present day.

*Jesuits.*—A congregation founded as a lay order by Saint John Colombini, in 1376, who, upon being converted by reading the life of Saint Mary of Egypt, turned his house into a hospital and adopted a life of continence, humbling himself to the condition of the poorest among whom he preached and worked. Urban V. confirmed them and gave them their habit, white, with white hood, a large brown mantle and wooden shoes. The order prospered for nearly three centuries; but, in 1668, Pope Clement IX. suppressed it because certain of their practices did not meet with approval.

*Jesuits, or Society of Jesus.*—An order founded by Saint Ignatius Loyola in the early part of the 16th century. (See *JESUITS*.)

*Lazarists.*—The Congregation of the Priests of the Mission, founded in 1624 by Saint Vincent de Paul, have always been popularly known as Lazarists, probably because of the fact that they were early located at the College of Saint Lazare in Paris. The institution was founded for the direct purpose of preaching missions in country districts in order that the peasantry might be awakened to the danger of making bad confessions, but the avowed object of its members as specified in its constitution, confirmed by Urban VIII., in 1632, is (1) the sanctification of its own members, (2) the work of preaching missions, and (3) the training of an exemplary clergy. At the present time the Congregation has houses in almost every part of the world, many Asiatic missions having been placed in their charge at the suppression of the Jesuits, in 1773.

*La Salette, Missionary Fathers of.*—A congregation founded at the shrine of Our Lady of La Salette, by Philibert de Bruillard, bishop of Grenoble, in 1852, in

commemoration of the apparition which had made the shrine so famous (19 Sept. 1846). The purpose of the congregation is based upon the teachings of "Our Lady in her Apparition," and is (1) to labor for the conversion of sinners by the preaching of missions and retreats, and (2) to devote special attention to combating the crimes of the age that were "recalled by the sorrowful voice of the Mother of God at La Salette."

*Marist Brothers, or Little Brothers of Mary.*—An order founded at Laval, France, in 1817, by the Venerable Joseph Benoit Marcellin Champagnat. The object is the education of youth.

*Marist Fathers.*—The Marists, otherwise known as the Society of Mary, is a religious order founded, about 1816, by Very Rev. Father Colin, who desired to establish an association which should unite the work of education with that of preaching missions. In 1818 Pope Pius VII. expressed his approval of the project, and, thus encouraged, Father Colin proceeded with his work of organization. From the beginning the Society has devoted itself to the foreign missionary field. In 1836, the Congregation of the Propaganda entrusted the organization with the work of spreading the faith in Western Oceania, and while no Catholic priest had ever visited the islands, the Marist Fathers penetrated even to the most savage tribes and everywhere succeeded in making converts to Christianity. Many missionaries were martyred by the cannibals, but, never discouraged, the Fathers returned to the work of civilization and salvation. The order is now represented in nearly every part of the world.

*Mary of Paris, Society of.*—Founded for the purpose of educational and missionary work, the society is extensively represented in all countries. The members are also known as "Brothers of Mary."

*Maurists.*—The popular name for the members of the Congregation of Saint Maur, that offshoot from the Benedictine order which became so famous during the 18th century, especially for its literary achievements. Founded, in 1618, by Dom Benard, as a more austere branch of Benedictines, it immediately received the support of high ecclesiastical authorities, and its influence extended throughout the country. While its early history was marked by its fervor for the religious life, its later record was not so brilliant. Infected by Jansenism; overrun by a demand for a relaxation of almost every rule, tainted by the pseudo-philosophic spirit of the age, and, in some places, even by Freemasonry, the dissensions which were awakened by the opposing factions would have been sufficient to have wrecked the order ultimately even if the suppression of 1792 had not come to put an end to its existence.

*Mechitarists.*—A congregation founded by Mechitar, an Armenian youth of an ancient Catholic family, in the early part of the 18th century. While a firm adherent of his Church, his love for his nation was so great that he determined to devote his life to the instruction and improvement of his people. From the time of his ordination as priest, in 1699, it was his ambition to found a convent from which his educational work might be conducted; but while he made several unsuccessful efforts, it was not until about 1717, when he obtained the right to the island of San Lazzaro, from the government of Venice, that he was able to see his hopes realized. There he founded the great Armenian convent from which the works of the Mechitarist presses go forth to all parts of the world in which there are Armenians to read them.

*Mercy, Fathers of.*—An order founded in 1808 by Very Reverend Jean Baptiste Rauzon, vicar-general of Bordeaux, for the restoration of religion in France after the Revolution. At that time the Fathers were known as "Missionaires de France." In 1834 the society now called Fathers of Mercy was formed, its object being to give missions and retreats, to assist the parochial clergy in preaching, and to conduct colleges, seminaries, and other educational institutions.

*Minims, or Paulanites.*—Names popularly applied to the Minim-Hermits of Francis of Paola, an extremely austere order of friars founded by Saint Francis of Paola, about 1437. When a boy of 13 Saint Francis had shown such a desire to lead a religious life that he was sent to a Franciscan convent, but, while he displayed extraordinary piety and no little affection for the Franciscan rule, he withdrew from the convent, and, at the age of 19, was living the life of a hermit in a solitary place near his native town. Young as he was his piety was unquestioned, and he was finally prevailed upon to receive some disciples, with whom, in separate cells, he founded his first community. Although no written rule of life had been prepared the members of the new order observed a perpetual Lent from the first day of its inception, and the austerity of the rule was never relaxed.

*Minorites.* (See *FRANCISCANS*.)

*Missions, Congregation of the.* (See *LAZARISTS*.)

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*Most Precious Blood, Congregation of the.*—The Congregation of the Most Precious Blood, otherwise known as Sanguinist Fathers, was founded in 1823 by the Venerable Caspar del Bufalo. The object of the new congregation was to counteract the evil effect that the French Revolution and the subsequent wars throughout Europe had had over the minds of the people. By preaching missions and giving retreats the Fathers called attention to the Precious Blood, and their efforts succeeded in arousing such a spirit of devotion that by 1840 the community had spread over the whole of Italy and into other parts of Europe. In 1843 the order reached the United States and established communities throughout the Middle and Western States.

*Nasareth, Brothers of.*—A religious order for laymen in the Protestant Episcopal Church. Founded in 1886, its objects are "prayer and manual work."

*Oblates.*—A congregation of secular priests who, as their name implies, "offer themselves" to perform any duty that a bishop may assign. The first institution of this character was founded in 1578, when Saint Charles Borromeo, archbishop of Milan, organized a band of zealous priests as the congregation of "Oblates of the Blessed Virgin of Saint Ambrose." The experiment proved so satisfactory that several other congregations have since been organized, conspicuous among which are the Oblates of Italy, an association founded in 1816 to assume control of the missions of Eastern Burma; the Oblates of Mary Immaculate, and the Oblates of the Sacred Heart.

*Observantines.* (See FRANCISCANS.)

*Our Lady of Lourdes, Brothers of.*—A congregation founded in 1830 by Very S. M. Glorieux, who desired to institute an order whose duty it should be to care for the orphan, to promote the Christian education of the young, especially in the case of the poor, and to nurse and care for the sick and aged. By a decree dated 18 July 1892 Pope Leo XIII. gave his full approbation to the order, which is widely represented both in this country and in Europe.

*Our Lady of Mercy, Military Order of.* (See TRINITARIANS.)

*Passionists, or the Discalced Clerks of the Most Holy Cross and Passion of our Lord Jesus Christ.*—An order founded by Saint Paul of the Cross, who assumed the habit of the order with the sanction of the bishop of Alessandria, in 1720. A year later, having formulated his rule of life, he went to Rome seeking permission to found his order. Although he was not looked upon with disfavor it was 1737 before the last obstacle was removed and the first monastery established. In 1746 the rules of the order were confirmed by Benedict XIV. and, shortly afterward, Clement XIV. favored the Fathers by conferring upon them the Church of Saints John and Paul, on the Coelian Hill. From that day the congregation rapidly extended, first throughout Italy, and, afterward, into other parts of Europe, even obtaining a good foothold in England by 1842. Ten years later the order was introduced into the United States by Bishop O'Connor of Pittsburgh. There are few orders that follow a more austere rule, for the Passionists fast three days in each week, as well as through Advent and Lent, and sleep little, rising to say all the offices in choir at the canonical hours. Their habit is simple, if not mean, nothing being worn on the feet but sandals, and all the time not given to the work of giving or preparing for missions or retreats is devoted to contemplation. Beside the three usual vows, members of this order take a fourth, that they will at all times do their utmost to keep the memory of the Lord's passion ever alive in the hearts of the faithful.

*Paulists.* (See PAULISTS.)

*Paulists.*—The regular clerks of the Scuole Pie, or religious schools, instituted at Rome during the 16th century.

*Picpus.*—There have been two congregations of Picpus, the first a reform of the Third Order of Saint Francis, which was instituted by Vincent Mussart in 1594; the second, a congregation founded by Pierre Coudrin, in the latter part of the 18th century. Having, like other seminaries, been dispersed by the French government, Coudrin formulated the plan for the organization of a congregation which should not only undertake to prepare candidates for the priesthood and the missionary field, but should protest against the infidelity of the times by maintaining a perpetual adoration of the Blessed Sacrament. So well did he plead his cause that he aroused the sympathies of high ecclesiastics, and, in 1805, he was able to open the first house of his congregation in the Faubourg Saint Antoine, Paris. By 1817, when the full approbation of the Holy See was obtained, the Fathers of Picpus were in control of several important educational institutions, and, in 1825, a company of the priests of the order were sent to the Pacific Islands by Leo XII., in the hope that they might convert the

savage natives to Christianity. From that time most of their activity has been devoted to missionary endeavors, and the fact that their membership has included such men as Father Damien, whose work among the lepers will never be forgotten, explains the reason for their great success in the mission field.

*Preachers, Order of.* (See DOMINICANS.)

*Premonstratensians.*—An order of regular canons founded by Saint Norbert at Premontre, near Laon, in 1119. The rule of the order is that of Saint Austin, its habit is white, whence its members have frequently been known as "White Canons." While its founder imposed perpetual fasting and an entire abstinence from meat as an inviolable rule, a gradual relaxation occurred, and from time to time the order was threatened first by one then by another of the several reform movements which were instituted. In spite of this it flourished and, at one time, there were more than a thousand Premonstratensian houses in various parts of Europe. Then came the religious disturbances in England, the Reformation, and, finally, the Revolution, at the close of which only eight houses remained undisturbed. Since that time a few more houses have been opened, especially in England, but there is no comparison between the present almost impoverished institutions and the order which was once such a powerful influence in the religious life of Europe.

*Recollects.*—A branch of the Franciscan order which has been in existence for more than three centuries. Although originally (1597) the French branch of the reform movement led by the friars of the Strict Observance its members have guarded the austerity of their rule so zealously and have kept so free of any taint of Jansenism that many favors have been shown them, one being the order which placed them in charge of the convent at Jerusalem.

*Redemptorists, or Congregation of the Most Holy Redeemer.*—A congregation founded by Saint Alphonsus Maria de Liguori at Scala, in 1732, as the result of his experience in evangelistic work among the poor. Both in the great cities like Naples and in the rural districts which he had visited for the purpose of giving missions Alphonsus had found a moral and spiritual destitution which appealed to him as most pitiable, and it was his desire to institute an order of zealous men who should be willing to strive to copy the life of Jesus Christ in all things, especially in following His example of evangelistic work among the poor and needy, that led to the formation of this congregation. Beset by many obstacles and hindered by opposition from strong political sources Saint Alphonsus persisted in his work. One by one houses were founded in different parts of the Papal States, gradually they spread beyond the Alps, and when, in 1749, Pope Benedict XIV. approved its rule the Congregation was in a most prosperous condition. Originally called the Congregation of the Most Holy Saviour, the name was changed to that of the Most Holy Redeemer, by order of the Pope, but its rule remained unchanged. The members not only take the three simple vows but make a fourth, a vow of perseverance until death in the institute, and their vow of poverty binds them to refuse all dignities and offices that may be tendered them outside the Congregation. The chief occupation of the Redemptorists is the preaching of missions and retreats to persons of all classes, but especially to those who are most neglected by other clergy. In fact so anxious was the founder that the Congregation would pursue this principle, that he forbade its members to undertake any educational work that might distract their minds from the neglected poor to whom he desired them to devote their lives. The order, which still flourishes, is under the direction of a superior called the Rector Major who is elected for life.

*Rosminians, or Fathers of Charity.*—A congregation founded in 1828, by Antonio Rosmini, for the purpose of promoting works of charity of every sort, an aim which was fully realized, for during the first 10 years of its existence its members were engaged in preaching and teaching, in giving retreats, in visiting the sick, in missionary work at home and abroad, in caring for prisons and hospitals, in almsgiving and in general literary labors. During this period the order had extended to England and it is now represented by houses in almost every part of the world.

*Sacred Heart, Brothers of the.*—A congregation founded at Lyons, France, in 1820, by Pere André Coindre, a member of the Society of Missions. The two objects of the institution are (1) self-sanctification by devotion to the Sacred Heart, and (2) the Christian education of youth in schools, asylums and colleges. In September 1900, at a general chapter held in France, two new provinces were established, one for the United States and the other for Canada. A novitiate house for the United States was opened at Metuchen, N. J., in June 1901, and this is now the official residence of the provincial of the order.



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**Saint Charles Borromeo, Congregation of the Missionaries of.**—A congregation founded by Bishop Scalabrini at Piacenza, Italy, in 1887, its object being to provide missionaries to the Italian emigrants to North and South America. Although the scope of work and aim of the congregation is restricted to this field, the institution of the order met with the warmest approval of Pope Leo XIII., and his letter of 1888, addressed to the archbishops and bishops of America, in which the late Pontiff expressed his interest in the purpose of the new organization, has done much to further its work in this country.

**Saint Francis Seraphicus, Poor Brothers of.**—An institute founded 24 Dec. 1857 by Philip Hoever, principal of Saint Peter's parish school, Aix-la-Chapelle, Germany. Its object is the promotion of the Christian education of youth.

**Saint Gabriel, Brothers of.**—An institute founded in 1705 by the Blessed Louis Marie Grignon de Montfort. Its object is the education and Christian instruction of youth as well as the care of deaf, dumb, and blind institutions and orphan asylums.

**Saint John of God, Order of.**—The Order of Charity of Saint John of God was founded by the Saint at Granada, in 1350. Its object was to serve the sick, and this purpose was adhered to so zealously that it had more than 280 hospitals under its care when it was practically suppressed by the Jacobins in France and the Liberals in Spain. A few houses by the order still exist.

**Saint John the Evangelist, Society of Mission Priests of.**—Founded by several ritualistic clergymen of the Church of England, at Cowley, England, in 1865, the objects of this society are to assist its members in striving after Christian perfection and to work for the advancement of God's glory by conducting missions and retreats, and by such other methods as He may suggest. The first company of Fathers arrived in the United States in 1872, and they are now extremely influential, especially in high church circles.

**Saint Joseph, Order of.**—A title that has been borne by two communities: (1) the Order of Priests of the Mission of Saint Joseph, a congregation founded by Jacques Cretenet, at Lyons, in 1640. Its purpose was devotion to foreign missions. It was suppressed by the Revolution. The present bearer of the name is the Order of Saint Joseph, a teaching order founded at Grammont, Belgium, in 1817, by Canon Van Crombrughe, its purpose being the improvement of the education given the children of persons of the commercial and industrial classes.

**Saint Vanne, Congregation of.**—The Congregation of Saint Vanne devoted its efforts to educational and especially to literary pursuits. Its houses were suppressed by the Revolution.

**Saint Viateur, Clerics of.**—The community of the Clerics of Saint Viateur was founded in 1835 by Very Rev. F. L. M. J. Querbes, pastor of Vouries, near Lyons. Its objects are educational.

**Salesian Fathers.**—The order of Salesians is a society of priests and lay brothers founded by Don Bosco, a priest of Turin, Italy, in 1864. In 1874 the order received the approval of Pope Pius IX. Its primary object is the rescuing of poor, homeless boys from the street, providing them with food and shelter in the institute of the society. There they receive a sound moral and religious education as well as practical instruction in some one of the arts, sciences, or branches of trade, according to their inclination or ability. The society is also engaged in other educational work.

**Sanguinists.** (See SANGUINISTS.)

**Sempringham, Order of.**—Founded by Gilbert, a priest of Sandringham, England, about 1135, it enjoyed considerable prosperity until the Dissolution when all its houses were suppressed. The rule followed was that of Saint Austin, modified by statutes of Gilbert's own making.

**Servites.**—The order of Servites, or of the Religious Servants of the Holy Virgin, was founded in 1233 by seven pious merchants of Florence. Becoming possessed of the idea that they had been admonished to renounce the world, they sold their property, distributed the money among the poor, and, taking up their abode in a small house, lived according to a rule of great austerity, supporting themselves by begging in the streets. In 1276 the order was threatened with suppression by Innocent V. on the ground that it came under the prohibition of the Council of Lyons against the multiplication of religious orders. Owing to the efforts of Saint Philip Benite, however, the Pontiff was persuaded to withhold a formal decree, and it was not many years before the order began to be the recipient of all kinds of pontifical favors, culminating, in 1487, in the "Mare Magnum" of Innocent III., which placed the Servites upon a plane of equality with the other four mendicant orders. Like other orders it suffered greatly during the Reformation and

Revolution, but many of its houses have been rebuilt and there are now flourishing Servite establishments in many parts of the world.

**Strict Observance, Friars of the.**—An austere branch of the Franciscans established by Blessed John de Puebla, on the Sierra Morena, in Spain 1489. The branch, however, soon became a separate congregation and so remained until the various factions of the Observantines were reunited as "Friars Minor," by Pope Leo XIII., 4 Oct. 1897.

**Sulpicians.**—A society of priests founded in 1642 by Abbé Jean Jacques Olier at the seminary of Saint Sulpice in Paris. The members devote themselves to the direction of theological seminaries.

**Therians.**—A name applied to those Discalced Carmelites who live under the reform rule of Saint Theresa.

**Theatines.**—A congregation founded by Saint Cajetan and three friends in 1524. Embracing a most austere rule, binding themselves not only to have no property but even to ask no alms, depending solely upon the providence of God for their support, their numbers increased until the time of the Revolution. Their houses are now found only in Italy.

**Trappists.**—A reform of the Cistercian order instituted in 1662 by Armand Jean le Bouthillier de Rance. Assuming control of the abbey of La Trappe, in 1660, he found it in a most deplorable condition. The Cistercian rule had been so far relaxed that many of the members had ceased to live in community, and de Rance devoted all his efforts to the restoration of regularity and order. Establishing what he called the "Strict Observance of the Cistercian Order," he succeeded in persuading some monks of the Strict Observance to come to his assistance, and together they completely restored the discipline of the monastery. From La Trappe this austere rule spread into other parts of Europe where it met with such instant favor that some of the most flourishing monastic houses in the world are now those of the Trappist reformers.

**Trinitarians.**—An order founded at Rome in 1908 by Saint John of Matha and Felix of Valois, an aged French hermit, its object being the release of Christians—many of whom were held captives by the Turks who, having retaken Jerusalem, were holding their prisoners in such cruel slavery that an organized effort for their relief seemed an imperative necessity. The order, therefore, received the sanction of Pope Innocent III., and a monastery was opened at Cerfroy, France. The rule adopted by the Trinitarian monks was that of Saint Austin, made more austere by the peculiar statutes that were original with the founders. Immediately after the foundation of the first monastery the work was commenced with great vigor, and at one time it was estimated that fully 31,000 Christian captives had been rescued through this agency. In 1218 the Military Order of Our Lady of Mercy, which had the same general purpose as that of the Trinitarians, was founded and later, when it had thrown off its military character and adjusted itself more closely to the rule of Saint Austin, it became almost identical with the older order. In 1599 a reform of the first order was instituted by Father Juan Baptista, under the name of Discalced Trinitarians. This reform was approved by the Holy See, but its houses, as well as houses of all other branches of the order, were suppressed by Queen Isabella II. of Spain.

**Vincentian Friars.** (See LAZARISTS.)

**White Friars.** (See CARMELITES.)

**Xaverian Brothers.**—A teaching institute founded at Bruges, Belgium, by Theodore James Ryken, in 1846. The purpose of the founder was to organize "a congregation of men who would willingly sacrifice their lives to the Christian education of youth," an object which has been adhered to so closely that the order has long been regarded as one of the most successful teaching institutes of the Church.

### ORATORIES.

The Oratory, which has been such an important factor in the evangelistic work of the Roman Catholic Church, especially in England, had its inception in the mind of Saint Philip Neri, a native of Florence in the 16th century. Always conspicuous for the purity of his life and the desire to do good for young men, he early gathered about him a number of sympathetic souls who were ready to follow his guidance in order that they might lead a life of greater religious regularity. Although still a layman he preached to them in private, teaching them how to show more zeal for God without retiring from the world. In 1551, upon the advice of his confessor, Philip received holy orders, but even then he continued to receive his congregation in private, either in his own room or in a larger chamber, and it was from these daily colloquies that he evolved the system of evening exercises which has always been maintained by his Congregation. This consists of a popular devo-

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tional exercise, a few hymns and a plain sermon preached, somewhat conversationally, directly at the hearts of the people. These exercises, which were held on every week-day evening except Saturday, became so popular that, in 1558, he obtained permission to build a chapel in the Church of Saint Jerome. He called it an "oratory," and it was from this that his Congregation obtained its name. It was at about this time that Philip's work attracted the attention of some of the most zealous churchmen in Europe, and so many of them joined him that, in 1564, he felt justified in assuming charge of the Church of Saint John the Baptist which had just been completed at Rome. In 1575 the Congregation had so increased in numbers that it was deemed necessary that they should have an establishment of their own, and, the old church of the Vallicelli being ceded to them, Philip began the erection of the present edifice, called the "Chiesa Nuova," on the old site. At its completion he rejoined his Congregation, the constitution of which had already been approved by Pope Gregory XIII., and remained in Rome until his death, in 1595. The conception which was the basis upon which Saint Philip founded his Congregation was that there were people in the world who were not in sympathy with the work of the monastic orders but who might be reached if sought in another way. He proposed, therefore, that his Congregation should be composed of simple priests. They should take no vows, and while they should be bound by a certain rule of life while associated with the community, they might withdraw without reproach at any time. To his followers he taught his methods, imbuing them so zealously with the spirit of his work that it is still conducted as if he himself were present to direct it. Instead of taking a combative position he assumed one of tranquillity. Instead of going out in search of sinners he sat in his own room and let them come to him. He abhorred all that savored of the systematic; he made few attempts at the exposition of doctrine, and he avoided the catechetical schools. Instead he accepted the inevitable, the conditions which he knew he could not change, and simply tried, as Cardinal Newman said, "to sweeten and sanctify what God had made very good and man had spoilt." With unaffected humility and love he gathered "his family" around him, and they, convinced by the eloquence of his personal character, took up his work and followed him. For nearly three centuries the work of the Oratory was confined to Italy, but, in 1847, Dr. Newman introduced it into England. The first house was instituted at Mary Vale, or Old Oscott, but, in January 1849, it was transferred to Alcastre Street, Birmingham. A few months later Father Frederick Faber, one of the most eloquent men the Oratory has ever produced, opened another house at King William Street, Strand, London, where, assisted by several of the priests from Birmingham, he soon gathered a large congregation of listeners. For about a year the London house was in affiliation and under the direction of the house at Birmingham, but as such a system was not entirely in keeping with the spirit of the constitution which provided that each house should be independent, the London Oratory was released from its obedience to the older oratory in 1850, and, shortly afterward, it was transferred to Brompton, from which place it has exerted a wide influence over Catholic thought in England. During the history of the Roman Catholic Church other congregations have adopted the title of "The Oratory." In 1611 Cardinal de Berull of Paris organized a society of priests under this name, which, in 1614, was changed, by Pope Paul V., to "The Congregation of the Oratory of Our Lord Jesus Christ in France." Like the Italian Oratory of Saint Philip, the members of the French society were simple priests. As Bossuet says, its founder "preferred to give no other spirit to his company but the spirit of the Church itself, no other rule than her canons, no other superiors than her bishops, no other bond but charity, and no vows but those of baptism and ordination." The object of this organization was chiefly to promote the spirit of devotion among the secular clergy, a work which was partly conducted by the institution of seminaries for the education of candidates for the priesthood. At the death of the founder, in 1629, the congregation was represented by more than 50 seminaries, colleges and houses of retreat, while it was generally admitted that the society had been the means of deepening the ecclesiastical devotion and strengthening its discipline, an influence which was already making itself apparent throughout the entire population. After the death of the Cardinal the work was continued under the direction of Père de Condren, who was followed by other good men and strong leaders, and while for a time its usefulness as a church organization was threatened by the influence of Jansenism, which found many converts among its members, the orthodox section finally proved the stronger, and the bull was accepted by the vote of the congregation in 1746. When other orders were immediately

suppressed by the Revolution the Congregation's valuable work in the cause of education saved it for a time and it might have passed through those troublous times without molestation if the Fathers themselves had not resisted the authorities by refusing to be present at certain services appointed to be held in their own church. Later a few of the members took the oath required, but the congregation never regained its influence. In 1852 a congregation known as the "Oratory of the Immaculate Conception" was instituted at Paris by the Abbé Graty and M. Petetot, curé of Saint Roch. Later this organization adopted the rule of the French Oratory.

### ORDERS OF WOMEN.

The following is a list of the most prominent orders of women that have been or are now in existence in the Roman Catholic and Protestant Episcopal churches:

*All Angels, Community of.*—A sisterhood in the Protestant Episcopal Church. Founded by the Bishop of Delaware and incorporated in 1895, its members are engaged in all kinds of educational and charitable work including the care of a day nursery and orphanage for factory children. The order is under the direction of the Bishop of Alabama.

*All Saints' Sisters of the Poor.*—An order established in the Church of England in 1851 by Rev. W. Upton Richards, and introduced into the United States by the Bishop of Maryland in 1890. Its members have undertaken all kinds of charitable and educational works, ranging from fashionable boarding schools for young ladies to day mission schools for colored children.

*Angelicals.*—An order of nuns, followers of the rule of Saint Augustine, founded by the Countess of Guastalla, in 1530.

*Annunciation of the Blessed Virgin Mary, Sisters of.*—A society incorporated in 1893 to receive and care for incurable and crippled girls between the ages of 4 and 16 years.

*Apostoline Sisters.*—An order founded at Loda, Ill., 15 Aug. 1884, by Rev. Louis Heidemann. Its object is the education of youth.

*Assumption Sisters of the.*—An order founded by Monsignor Afire, archbishop of Paris, in 1839. It is chiefly an educational order. The Little Sisters of the Assumption nurse the sick poor in their own homes night and day; caring for the children and the house in order that the home may not be broken up during the illness of some of its members. For these services they accept no pay, not even food.

*Atonement, Sisters of the Society of.*—An Episcopal order for women in affiliation with the order of the same name for men.

*Basilian Nuns.*—The Basilian nuns were founded by Saint Macrina, but nearly all afterward became affiliated with the Eastern Church.

*Beguine Nuns.*—The female branch of the Beguine order of monks.

*Bethany, Sisters of.*—An order founded in New Orleans, La., and now under the pastoral care of the Episcopal bishop of that diocese. Its object is the care of neglected children.

*Bon Secours, Sisters of.*—Instituted by Mgr. de Quelen, archbishop of Paris, 1822, for the purpose of caring for the sick in their homes and for the orphans in asylums provided for them. The Sisters of Notre Dame de Bon Secours, founded in 1840, by Rev. Paul Sebastian Millet of Troyes, France, has practically the same object.

*Blessed Sacrament Sisterhoods.*—The orders of Blessed Sacrament nuns are of recent origin. Those of the Perpetual Adoration, as their name implies, devote their constant attention upon the devotions to the Holy Eucharist. The Sisters of the Blessed Sacrament for Indians and Colored People is an American order, founded in 1889, by Mother Mary Katherine. Its purpose is the elevation, education and christianization of the two races.

*Blessed Virgin Mary, Institute of.*—One of the few Roman Catholic orders of English origin instituted since the Reformation, it was founded by Mary Ward, the daughter of a gentleman of large estate, in 1611. A teaching order of the highest class, it prospered from the first, and it is still a flourishing religious institute, being popularly known as "the Institute of the English Virgins." The rule of the order has always been practically the same as that of the Society of Jesus.

*Brigitines.*—The order founded by Saint Bridget of Sweden in 1344 was instituted both for men and women, each monastery being double.

*Calvarian Nuns.*—There have been two congregations of Calvarian nuns, both of which still flourish. One was founded at Poitiers, by Père Joseph, a Capuchin, in 1617; the other, which has for its purpose the education and support of destitute and home

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less girls, was instituted at Genoa, in 1619, by Virginia Braccelli.

*Camaldoli.*—The female branch of the austere order of the Camaldoli.

*Charity, Sisters of.*—There are many orders and branches of orders in the Roman Catholic Church which bear the name of Sisters of Charity. Some of them are also called "Gray Sisters," or "Gray Nuns," "Daughters of Charity," "Sisters of Saint Vincent de Paul," etc. The oldest order was founded in Paris in 1634, by Saint Vincent de Paul, assisted by Mlle. Louise le Gras, and its constitution has never been changed. Instead of making perpetual vows the Sisters take the simple vows, which are renewed annually, when they also add a fourth vow, binding themselves to care for the sick. The order of Sisters of Charity in the United States was founded by Mother Seton, who, after her conversion to the Roman Catholic faith, devoted her life to the charitable works of the Church. Her first community, which was known as the Sisters of Charity of Saint Joseph, was established at Emmitsburg, Md., 31 July 1809. The Sisters of Charity of Cincinnati, Ohio, are a branch of the order founded by Mother Seton. The Sisters of Charity of Saint Paul are a congregation largely devoted to teaching. It was founded in 1704 by M. Chauvet, a French curé, assisted by Mlle. de Tilly. The Sisters of Charity (Irish) are an order which is very similar in purpose to that founded by Saint Vincent de Paul. Its members minister to the sick and poor in hospitals and at their own homes. It was founded in 1815 by Mrs. Mary Francis Aikenhead. The congregation of Sisters of Charity of the Blessed Virgin Mary devote themselves exclusively to the education of youth. The order was founded in Philadelphia, Pa., by Very Rev. Terence James Donoghue, assisted by Mother Mary Francis Clarke, its first superior-general, on 1 Nov. 1833. The Sisters of Christian Charity devote themselves to educational work and to the care of poor and orphaned children. The Sisters of Charity of Nazareth are an American community founded in 1812. Its members devote themselves to educational and charitable works. The Sisters of Charity of Our Lady Mother of Mercy, are a congregation founded by the Most Rev. John Zwyzyn, archbishop of Utrecht, in 1832. Its purpose is the education of youth, as well as the care of the sick, aged and orphaned. The latest work undertaken by these Sisters is the care of the lepers at Paramaribo, Dutch Guiana. The order of Sisters of Charity of Providence was founded in Montreal 25 March 1843. Its work is educational and charitable, including the care of hospitals. The Sisters of Charity, Servants of the Poor; Sisters of Charity of the Cross (Gray Nuns); the Sisters of Charity of the General Hospital of Montreal, and the Sisters of Charity of the Hospital of Saint Hyacinthe, are Canadian orders devoted to the care and education of the sick and poor.

*Cistercians.*—The female branch of the order of Cistercian monks.

*Cluny.*—The female branch of the Congregation of Cluny.

*Carmelites.*—The female branch of the order of Carmelite monks, reformed by Saint Theresa in 1562.

*Cross, Daughters of the.*—A congregation founded by Saint Francis de Sales, whose rule it still follows. Its work is strictly educational. In addition to their educational work the Gray Nuns of the Cross care for the sick, the orphan, and the aged.

*Discalced Carmelites.* (See CARMELITES.)

*Divine Compassion, Sisters of the.*—A congregation founded in 1873, by Rt. Rev. Mgr. Preston. Its object is the mental and moral training of young girls.

*Divine Saviour, Society of.*—A congregation instituted in Italy for the purpose of caring for the sick in their homes.

*Epiphany, Society of the.*—A Protestant Episcopal sisterhood, established in 1897 by the Bishop of Washington, D. C. Its objects are the protection and training of the young, and the giving of spiritual assistance to women living in the world by providing retreats and religious instruction for them.

*Faithful Virgin, Sisters of the.*—An order founded in Normandy, about 1840. Its purpose is the care of orphans.

*Good Shepherd.*—There are several sisterhoods of the Good Shepherd. The oldest order, the Sisters of the Good Shepherd, was founded by Pere Eudes, of the Eudist Fathers, assisted by Marguerite l'Ami, in 1641. The Sisters of Our Lady of Charity of the Good Shepherd of Angers are a community founded by Mother Mary of Saint Euphrasia Pelletier, in 1827. The Sisters of Our Lady of Charity of Refuge were also founded by Pere Eudes (1651) and were introduced in America by Rt. Rev. John Timon, bishop of Buffalo, N. Y., in 1855. Each of these orders has for its objects the training of young girls to virtue, and the reformation of fallen women.

*Good Shepherd Sisters.*—There are now two branches of the sisterhood of the Good Shepherd in the Protestant Episcopal Church in the United States. The Saint Louis branch, incorporated in 1867, has charge over Bishop Robertson Hall, the diocesan school for girls; the California branch, Sisters of the Order of the Good Shepherd, has charge over the Old Ladies' Home, the Sheltering Arms, three hospital missions and the parish visiting.

*Helpers of the Holy Souls, Society of.*—A congregation which, instituted in Paris, France, was established in New York city in 1892. Its purpose is to visit and nurse the sick poor in their homes and to provide religious instruction to children and adults, all its works being undertaken with the view of helping the souls in Purgatory.

*Holy Child Jesus, Sisters of.*—A cloistered sisterhood devoted to the care and education of children.

*Holy Child Jesus, Sisterhood of the.*—An order established by the Protestant Episcopal Bishop of Albany for the purpose of conducting educational and charitable works in his diocese.

*Holy Communion Sisters.*—There are two branches of the Sisterhood of the Holy Communion in the Episcopal Church, and both are established in New York city. The older branch, which was organized by Rev. Dr. Muhlenberg in 1852, was the first order of Episcopal Sisters to be established in America. Its members are engaged in parish visiting, nursing, the care of the altar service and clerical vestments, and in various kinds of educational and charitable work. The younger sisterhood conducts a shelter for respectable girls.

*Holy Cross, Sisters of the.*—A congregation founded at Le Mans, France, in 1839 by Very Rev. Anthony Basil Moreau. Its objects are educational and the care of hospitals and orphan asylums. The order is sometimes known as the "Sisters of the Holy Cross and of the Seven Dolours."

*Holy Family.*—There are several sisterhoods of the Holy Family. The oldest, the Congregation of the Sisters of the Holy Family, a colored sisterhood, was founded in 1842. The Sisters conduct educational and charitable establishments in the archdiocese of New Orleans. The Sisters of the Holy Family of Nazareth was founded in 1874 by Frances Siedliske, a noble Polish lady. The Sisters of the Holy Family in California devote themselves to the relief of the sick and the poor, caring for and educating very young children whose mothers are obliged to work. The Little Sisters of the Holy Family is a community founded at Memramcook, N. B., in 1874. Its one purpose is the temporal care of educational institutions.

*Holy Ghost, Sisters of.*—An order founded in 1850 by the late Archbishop Hennessy of Dubuque, Iowa. Its objects are: (1) The glory of the Holy Ghost, and (2) the promotion of Christian education. The order of the Sister-Servants of the Holy Ghost was founded in Stell, Holland, in 1889. There is no affiliation between these orders.

*Holy Heart of Mary, Sister-Servants of.*—An order founded by Rev. Father Delaplace of Paris, France, in 1860. Its members conduct all kinds of works of charity.

*Holy Humility of Mary, Sisters of the.*—A community founded in France, in 1854, by Rev. John Joseph Begel, assisted by Miss Antoinette Poitiers. In 1864 the entire community, with its founder, immigrated to the United States, and settled near the village of New Bedford, Lawrence County, Pa. The works of the Sisters include teaching, the care of the sick, the education of orphans and the decoration of altars.

*Holy Names of Jesus and Mary, Sisters of the.*—A community founded at Longueuil, Canada, in 1843. Its objects are educational.

*Holy Nativity, Sisterhood of the.*—An order established in 1883 by Rt. Rev. C. C. Grafton, Protestant Episcopal bishop of Fond du Lac. Its members are engaged in various kinds of missionary and parochial work.

*Immaculate Heart of Mary, Sister-Servants of the.*—A congregation founded in Quebec, in 1850, by Most Rev. P. F. Turgeon, archbishop of Quebec, assisted by Mr. George M. Muir and Mrs. Mary Fitzback, who became Mother Mary of the Sacred Heart, the first superior of the order. The objects of the congregation are two-fold: (1) The reformation of fallen women, and (2) the education of children. The Daughters of the Immaculate Heart of Mary, instituted in France, perform all kinds of charitable works, conducting academies, orphanages, female industrial schools, kindergartens, homes for working girls, mental and training schools for deaf-mutes, night refuges for homeless women, Indian missions, etc.

*Incaruate Word and Blessed Sacrament, Sisters of the.*—An order founded at Lyons, France, by Venerable Jane Chezard de Matel, in 1625. The American foundation was made at Brownsville, Texas, in 1854.

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Although the order has many houses in various parts of the world they are independent of each other. The Sisters of Charity of the Incarnate Word are an American offshoot of the French community, having been founded by Rt. Rev. C. M. Dubois, bishop of Texas, in 1866.

*Jesusites.*—An institution of women who aspired to live under the vows and rules of the Jesuits. It was abolished by Pope Urban VIII. in 1633.

*Jesus, Society of the Faithful Companions of.*—A congregation instituted at Amiens, France, in 1820, by Mme. de Bonnault d'Houet (*née de Bengy*). While its main objects were and are the sanctification of souls and the improvement of female education, the order has been engaged in parochial school work for many years.

*Jesus-Mary, Religious of.*—A congregation founded at Lyons, France, in 1811, by the Abbé Coindre. Its purpose is the care of orphan asylums and the education of young girls, especially in boarding schools.

*La Sagessa, Sisters of.*—An order founded in 1703 by the Blessed Louis M. Grignon de Montfort, assisted by Miss Louise Trichet, afterward Sister Mary Louise of Jesus. Its works are educational and charitable.

*Little Company of Mary.*—An order founded about 1870 in Nottingham, England. Its purpose is the care of the sick in their homes and in hospitals.

*Little Sisters of the Poor.*—An institute established in 1840 by M. la Pailleur, the curé of Saint Servan, in Brittany, and formally approved by the Holy See in 1854. Its object is the establishment of permanent homes for the aged and infirm of both sexes without distinction of creed or nationality. The Sisters of the Poor of Nazareth is an English offshoot from the Little Sisters.

*Loreto Nuns.*—There are several orders of Loreto Nuns, the oldest being that of the Ladies of Loreto, founded at Munich, Bavaria, by Mme. Maire, in 1650. Its first American house was established at Toronto in 1847.—The Society of Sisters of Loreto, or Friends of Mary at the Foot of the Cross, was founded by Rev. Charles Nerinckx, a Flemish missionary, in 1812.—Another branch of the Sisters of Our Lady of Loreto was established by Mrs. Mary Teresa Ball, at Rathfarnham, near Dublin, Ireland, in 1822. It was from this foundation that have sprung the many convents of Loreto nuns in Ireland. Although not affiliated the objects of the orders are very similar. Their work is educational and missionary.

*Marist Sisters.*—An order founded by Father Colin of the Marist Order, in 1817. Its objects are educational.

*Mercy, Sisters of.*—An order founded in Dublin, Ireland, in 1827 by Miss Catherine McAuley, afterward mother-superior. Besides the three vows the Sisters took a fourth to devote their lives to the service of the poor, the sick and the ignorant, an obligation which has been observed so zealously that the order has become one of the most important communities in the world. The sisterhood was introduced into the United States in December 1843, when seven Sisters came from Carlow, Ireland, to establish a convent at Pittsburgh, Pa.

*Mercy, Sisters of.*—The Church of England order of Sisters of Mercy was founded about 1845 by Miss Lydia Sellon at Devonport. The only vow exacted is that of obedience during community life, and members are permitted to withdraw from the convents at will.

*Misericorde, Sisters of.*—An order founded in 1848 by Mgr. Bourget, assisted by Mme. Roselle Jette, afterward Mother Saint Lucie, superior-general. Its objects are the care of the sick and of homeless infants.

*Mission Helpers, Institute of.*—Founded at Baltimore, Md., in 1888, its Sisters visit the sick and poor in their homes and give religious instruction to children and adults. The direct object of the community is to advance the perfection and assist in the sanctification of the priesthood.

*Notre Dame Sisters.*—There are several orders of the Sisters of Notre Dame. That of the School-Sisters of Notre Dame was founded in 1803 by the Venerable Julie Billiart, assisted by her friend, the Viscountess de Gezaincourt. Its object is the salvation of the souls of poor children. The Sisters of Notre Dame are a community founded at Montreal, Canada, in 1657, by the Venerable Mother Marguerite Bourgeoys. Its object is the instruction of youth.

*Our Lady of the Holy Rosary, Congregation of.*—Founded at Rimouski, Province of Quebec, Canada, 12 Sept. 1879, its object is the Christian instruction and education of the poor.

*Our Lady of Good Counsel, Sisters of.*—A community founded in 1894 by Bishop Labrecque of Chicoutimi. Its objects are solely educational.

*Our Lady of Lourdes.*—The order of Our Lady of Lourdes was founded by Archbishop Perche of New Orleans, on 25 Feb. 1883.

*Our Lady of Perpetual Help, Sisters of.*—An order founded at Saint Damien, Province of Quebec, Canada,

by Rev. J. O. Brousseau, assisted by Mlle. Virginia Fournier, afterward Sister Saint Bernard, the first superioress of the community. Its objects are educational.

*Our Lady of Sion, Congregation of.*—Founded at Strasburg, in 1842, by M. Alphonse Ratisbonne, of a wealthy Jewish family, in commemoration of an apparition of the Blessed Virgin Mary with which, he claimed, he was favored, and which had resulted in his conversion. The rule of the congregation aims at the union of the active with the contemplative life, and its object, which has never changed, is the care and education of converts from Judaism. The most important houses of the congregation are located in Palestine and Syria.

*Our Saviour, Regular Canonesses of the Five Wounds of.*—A congregation founded at Lyons, France, its purposes are both educational and charitable.

*Poor Handmaids of Jesus Christ.*—A congregation of Sisters founded at Dernbach, Germany, in 1851, by Miss Catherine Kaspers. Its rule, which was compiled by Rt. Rev. J. P. Blum, bishop of Limburg, and its objects, which are in the highest sense charitable, were approved by the Holy See in 1870. The order was introduced into the United States in 1868, by Rt. Rev. J. H. Luers, bishop of Fort Wayne, Ind.

*Poor Clares.* (See SAINT FRANCIS, SISTERS OF.)  
*Premenstratensians.*—The monastic order of Premenstratensians was in affiliation with this order of nuns.

*Presentation of the Blessed Virgin Mary, Order of the.*—An order founded in Ireland, 1777, by Miss Namo Nagle. At first there was no enclosure and members took simple vows only, which were renewed annually, but, in 1805, Pope Pius VII. raised it to the rank of a religious order with solemn vows and strict enclosure. A fourth vow was then added by which the members bound themselves to devote their lives to the work of instructing poor girls in the precepts of the Christian faith.

*Providence, Sisters of.*—The Sisters of Providence, who also devote themselves to the instruction of young girls, were founded in Lorraine, in 1762, by the Venerable Jean Martin Moye. The first institution of the order in America was opened at Saint Mary's, near Terre Haute, Ind., 22 Oct. 1840. There are several branches of the Sisters of Providence, including the Oblate Sisters of Providence, the Sisters of Divine Providence and the Sisters of Providence of Kentucky.

*Redemptorists.*—The Sisters of the Order of the Most Holy Redeemer are affiliated with the Redemptorist order of monks. They are strictly enclosed and contemplative and assist the missionaries by their prayers.

*Resurrection Sisters.*—There are two orders of Resurrection Sisters in the Episcopal Church of the United States. The Sisters of the Resurrection were instituted by the Bishop of Florida in 1891. Its members conduct an educational and industrial school for orphans. The Sisters of the Order of the Holy Resurrection were founded by the Bishop of Georgia in 1894. The work of the members is of a charitable character.

*Sacred Heart, Ladies of the.*—The Society of Ladies of the Sacred Heart was founded at Amiens, France, by Père Joseph Varin, S. J., assisted by Mlle. Madeleine Sophie Barat, in 1800. The community, which is semi-cloistered and follows the rule of the Society of Jesus, has for its object the Christian education of youth in boarding and parochial schools.—The Missionary Sisters of the Sacred Heart devote themselves to the care of the sick and the orphan as well as to general educational work.—The Sisters of the Holy Union of the Sacred Hearts, a congregation founded at Douai, France, in 1828, by the Abbé Debrabant, restricts its efforts to works of an educational character. Its rule and constitution were arranged from the somewhat mild rule prescribed for the Visitation Nuns by Saint Francis de Sales.

*Saint Agnes.*—The Sisters of Saint Agnes were founded at Fond du Lac, Wis., 1 Aug. 1870. Its objects are both charitable and educational.

*Saint Ann, The Sisters of.* were founded at Vaudreuil, Province of Quebec, Canada, by Mgr. Ignace Bourgot, in 1850. Its objects are chiefly educational.

*Saint Augustine, The Sisters of.* correspond to the Augustinian monks. While very old and widely represented in Europe there are but two branches of the order in America: The Sisters of Charity of Saint Augustine, established at Cleveland, Ohio, in 1850, by Sisters from Boulogne, France, and the Sisters of the Order of Saint Augustine now in charge of the Hospital of the Precious Blood, founded at Quebec in 1637. In this case the first Sister came from Dieppe, France.

*Saint Benedict.*—The order of Sisters, corresponding to the monks of Saint Benedict, was introduced into the United States by Rt. Rev. Boniface Wimmer in 1846. The first colony of Benedictine Sisters came

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from Eichstätt, Bavaria, and established their convent at Saint Mary's, Elk County, Pa. Many other convents have since been established in various parts of the country, including houses of the orders of the Benedictine Sisters of Perpetual Adoration, and the Oblate Sisters of Saint Benedict (Olivetans).

**Saint Bridget.**—The Sisters of Saint Bridget, or the Order of the Holy Faith, was founded in Dublin, Ireland, in 1857. Its purpose is the care over the religious education of poor girls and boys.

**Saint Dominic.**—The order of Sisters, corresponding to the monks of Saint Dominic, was introduced into the United States by Rev. Thomas Wilson in 1822. The first convent was established at Springfield, Ky., from which mother house convents have been established throughout the country. Their objects are educational and charitable. The Dominican Sisters of the Third Order of Saint Dominic were brought to this country in 1876, by Rev. J. Rochford, O. P., then provincial of the order. The Sisters conduct parochial schools and institutions for destitute children of both sexes. The community of Dominican Sisters known as the Congregation of Saint Catherine de Ricci, was founded by Rt. Rev. Bishop McNerny of Albany, N. Y., in 1880. Their objects are to give retreats for women and young girls, to prepare candidates for the sacraments, and to offer prayers and penance for the conversion of sinners, especially drunkards and blasphemers. The Dominican Sisters of the Perpetual Rosary, as the name implies, are in charge of the management of the Perpetual Rosary in America. Their house at West Hoboken, N. J., was established in 1891 by sisters from Bon Secours, France.

**Saint Francis.**—The first mother house of the Franciscan Sisters to be instituted in this country was that of the Third Order of Saint Francis established by the late Bishop Neumann at Glen Riddle, Pa., in 1855. At the present time the following orders of Saint Francis are represented in the United States: The Little Franciscan Sisters of Mary, founded at La Bair Saint Paul, Canada, 1891; the Franciscan Missionaries of Mary, founded in British India about 1850; the Sisters of Saint Francis, founded by Very Rev. Pamfilo di Magliano, O. F. M.; the Sisters of Saint Francis of Mary Immaculate, founded in 1865; the Sisters of Saint Francis, established at Buffalo, N. Y., in 1874; the Sisters of the Third Order of Saint Francis, founded by Rev. J. L. Bihn in 1869; the Sisters of the Third Order Regular of Saint Francis, incorporated as the Sisters of Saint Francis of Oldenburg in 1885; the Sisters of Saint Francis of the Sacred Heart; the Franciscan Sisters, founded in 1872; the Sisters of the Third Order of Saint Francis of Assisi, M. C.; the Sisters of Saint Francis, founded in 1875; the School-Sisters of Saint Francis; the Franciscan for Colored Missions, established in 1881; the Franciscan Sisters of the Perpetual Adoration, founded by Rt. Rev. M. Heiss in 1864; Franciscan Sisters of Christian Charity, founded in Wisconsin 9 Nov. 1869; Franciscan Sisters of the Sacred Heart, established in 1876; the Hospital Sisters of Saint Francis, founded in 1875; the Poor Sisters of Saint Francis of the Perpetual Adoration, established in 1875; the Sisters of the Poor of Saint Francis; the Sisters of Saint Francis, founded in 1890; the Franciscan Sisters of the Immaculate Conception, established 1891; the Felician Sisters, O. S. F.; the Sisters of the Third Order of Saint Francis, under the protection of Saint Cunegunda, Polish; the Sisters of the Third Order of Saint Francis of the Congregation of Our Lady of Lourdes, established 1877, and others. The Order of the Poor Clares is also well represented in the United States, the first Sisters having come from Rome, Italy, to open a house in Cleveland, Ohio, in 1875. As the Second Order of Saint Francis, the Clares are the oldest of the Franciscan orders for women, its founder, the virgin Saint Clare, having been received by Saint Francis in 1212.

**Saint John the Baptist Sisterhood of.**—An order in the Church of England, founded at Clewer, England, in 1851, and introduced into the United States in 1881. The work of its members is chiefly educational.

**Saint John the Evangelist, Sisters of.**—The sisterhood of Saint John the Evangelist of the diocese of Long Island is an American order in the Episcopal Church. Its work is chiefly charitable.

**Saint Joseph.**—There have been several sisterhoods of Saint Joseph, some of which have attained important positions in the religious world. The Lay Hospitaliers, Daughters of Saint Joseph, was once one of the great orders of France. It was founded by Marie Delpuch, at Bordeaux, in 1638, for the purpose of educating orphan girls, but it did not survive the Revolution.—The Nun Hospitaliers of Saint Joseph, an order that also became practically extinct at the time of the Revolution, was founded by Mlle. de la Farre at La Flèche in Anjou in 1643. In addition to the three vows of religion these nuns bound themselves to devote their lives to the service of the poor. At present they

are represented by several houses in Canada, one the Hospital of Saint Joseph of Ville Marie, having been founded by Mlle. Jeanne Mance in 1644.—The Sisters of Saint Joseph of the Good Shepherd is a congregation founded by Henri de Maupais, bishop of Puy, in 1650. Dispersed by the Revolution, it was reorganized in 1811. In 1836 six Sisters from Lyons came to the United States at the request of Bishop Rosati of Saint Louis, and they established a house of their order at Carondelet. The Sisters have always conducted all kinds of charitable work, including the gratuitous instruction of poor children and the care of such establishments as orphanages, institutions for the deaf and dumb, Indian and negro missions, and Magdalen asylums. The Sisters of Saint Joseph, an offshoot from the Sisters of Saint Joseph of the Good Shepherd, were established at Toronto, Canada, in 1850 by Bishop Charbonnel.—The Sisters of Saint Joseph of Bourg were founded by Mgr. Devie, bishop of Belley, in 1828. Its members are engaged in teaching and works of charity.—The Congregation of Sisters of Saint Joseph of the Apparition was founded in France by Mme. de Vialard, in 1833. Its members are employed in teaching and in nursing the sick. The Sisters of Saint Joseph of Cluny are a community founded by Anne Marie Javouhey in 1807, although its first house was not formally recognized until 1819. Mother Javouhey was its first superior, and, as soon as possible, she established her Sisters in all the French colonies, where they devoted themselves to the education, the conversion, and the civilization of the negro and other aboriginal races. The Sisters of Saint Joseph of Peace, a community founded in England, devote themselves to the training of girls for domestic service. In 1885 a branch of the sisterhood was established in Jersey City, N. J., by Bishop Wigger, and since that time the American house has extended the scope of its work until it now includes the care of the sick in their own homes, the care of a home and school for the blind, a hospital, and a convalescent and summer home for poor working girls.

**Saint Joseph of Nazareth, Sisterhood of.**—An order in the Protestant Episcopal Church established in 1892. Its objects are "the mutual improvement in religious knowledge of its members, and the furtherance of religious belief by means of the religious and community life, and afterward the exercise of charity in teaching and training the young."

**Saint Margaret, Sisters of.**—An order of missionary and nursing sisters, established in the Church of England, at East Grinstead, England, by Rev. J. M. Neale, D.D., in 1855. In 1873 an affiliated house was opened at Boston, Mass., and the American members of the order are engaged in conducting all kinds of hospitals, sanitariums and homes for incurables in various parts of the United States and Canada. Much of the work of the order is devoted to needy colored people.

**Sainte Marthe.**—The community of the Sister-Servants of Sainte Marthe was founded at Saint Hyacinthe, Canada, in 1890. Its members perform the housework for the diocesan seminary.

**Saint Mary.**—The institute of the Sisters of Saint Mary was founded by Rev. Dom Jerome N. J. Minsart at Namur, Belgium, in 1834, its object being the education of girls. In 1863 the order was introduced into the United States by Rt. Rev. John Timon, bishop of Buffalo, N. Y.

**Saint Mary and All Saints, Sisters of.**—An order of colored women trained for work among their own people by the Protestant Episcopal Sisters of All Saints.

**Saint Mary, Sisterhood of.**—Incorporated in New York in 1865, the Sisterhood of Saint Mary is one of the largest orders in the Protestant Episcopal Church. Its members conduct hospitals, sanitariums, and various other charitable and educational institutions in many parts of the United States.

**Saint Monica, Sisters of.**—An order established by the Episcopal Bishop of Springfield, Ill., for the purpose of instituting an association of widows "for intercessory prayer and the restoration to the Church of the primitive vocation of consecrated widowhood." The members are engaged in charitable works.

**Saint Saviour, Sisters of.**—An order in the Protestant Episcopal Church in California. Its members are engaged in the education of young girls.

**Sempringham.**—The nuns of Sempringham correspond to the order of monks.

**Sorrowful Mother, Sisters of the.**—A charitable and nursing order founded in Italy and introduced into the United States in 1889, its first house being established at Wichita, Kan.

**Theatines.**—An order of nuns corresponding to that of the Theatine monks. It was founded by the Blessed Ursula Benincasa in the latter part of the 16th century.

**Transfiguration, Sisters of the.**—A Protestant Episcopal sisterhood engaged in the care of homeless

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children and old ladies. Its labors are confined to Cincinnati, Ohio.

**Trinitarians.**—The order of nuns corresponding to the Trinitarian order of monks.

**Ursuline Sisters.**—The teaching order of the Ursulines was founded by Saint Angela Merici of Brescia, in 1537. Organized in Angela's kitchen as "The Company of Saint Ursula," its first objects were the nursing of the sick, the teaching of young girls and the sanctification of their own lives. At this time the members remained in the world, took no vows, and received communion in common once each month. The conversion of the society into a religious order was chiefly the work of Mme. de Sainte Beuve, a French woman, who built and endowed a convent for the congregation at Paris in 1610. Two years later Pope Paul V. enclosed the nuns, placed them under the rule of Saint Austin, with solemn vows, including a fourth, binding them to devote their lives to the instruction of the young. The Irish Ursulines were established at Cork in 1771, by Miss Namo Nagle, and the first Ursuline convent instituted in the United States was founded by nuns from France at New Orleans 7 Aug. 1727.

**Visitation Nuns.**—The Order of the Visitation was founded at Annecy in 1610 by Saint Francis de Sales, assisted by Saint Jane Frances, Mme. de Chantai, their object being to found a retreat for persons desirous of the religious life, but who were too weak, or otherwise undisciplined, to enter an austere order. As the result there were few corporal austerities, and little confinement, although the employment of time was minutely provided for. In 1618 the rule of the enclosure was adopted, and, although teaching was not a part of the founder's plan, all the American convents have devoted their attention closely to educational work. The first Visitation convent in the United States was established at Georgetown, D. C., in 1799.

### DEACONESSES.

The office of deaconess was one that was well recognized in the apostolic church, for while it may be questioned whether the certain references in the New Testament which have so generally been associated with the government of deaconesses really applied to them or not, the fact remains that some of the earliest writers of the Church recognized their usefulness and formulated rules of conduct for them. According to these rules it was necessary that a woman, to be a deaconess, should have been the widow of but one husband and that she should have borne children. It is true that exceptions were sometimes made and that virgins were occasionally admitted to these organizations, but this was a rare honor, it being the opinion of the church authorities that no woman who had not been a wife and a mother would be able to feel that sympathetic devotion to her work which was so necessary to its success. As that was the time prior to the institution of sisterhoods and as the deaconesses were the only women who were officially authorized to assume church work, there were many duties to which they were called. Among these was the care of the sick and poor, the ministering to those who were confined in prisons for conscience sake, the instruction of catechumens in the principles of their faith; assistance at the baptism of women, in addition to which they were supposed to exercise a general oversight over the female members of the congregations, both in public and in private, and were obliged to make regular reports that the bishops and elders might not be uninformed as to the conditions existing among their people. The work of the deaconesses continued until the middle of the 5th century. In the Greek Church such orders existed until the 12th century. Gradually, however, the sisterhoods took their place in the Church, and it was not until the 19th century that they were again revived, this time by the Protestant churches who felt the need of the assistance of women in conducting their religious work. The first order of deaconesses to be instituted in the modern church was in 1835 when Pastor Fliedner of Kaiserswerth, Prussia, established such a society in order that he might have an organized corps of nurses at his new infirmary, and the experiment was so successful that it was immediately copied by the Lutheran bodies in other parts of Europe. As instituted by Pastor Fliedner the "Order of Deaconesses of the Rhenish Province of Westphalia" was composed of three classes of members. The first class devoted themselves to the care of the sick poor and the rescue of fallen women by the means of Magdalen homes; the second class were engaged in teaching; while the third class, or visitation deaconesses, assumed the responsibilities of the regular parochial work. The members took no vows, and while plainly dressed, wore no distinctive habit. In 1840, at the request of the American church authorities, Pastor Fliedner brought four nurses to the United States where he established

a home in Pittsburg. In the Episcopal Church the work of the deaconesses is almost as important as that of the sisterhoods, it being of very much the same character. It is largely represented in the South, the branches in Georgia, Alabama, Kentucky, and Louisiana being important factors in the religious work of the denomination. The revival of deaconess work in the Methodist Church dates from about 1870, when the Bethany Society was organized in Germany. Like the Order of Deaconesses established by Pastor Fliedner, its members were devoted chiefly to nursing, a work which they conducted so successfully that there are now more than 200 of them engaged in the various German hospitals. The first effort to introduce the order into the United States was in 1886, when Rev. J. M. Thoburn, at a conference held at Bellefontaine, Ohio, urged the advantage that the Methodists of this country would gain from the institution of a deaconess home or training school. As the result, Miss Jane M. Bancroft, now Mrs. Robinson, was sent to Germany to acquaint herself with the work of the organization and, in October 1887, a Deaconess Home was opened in Chicago. The next session of the General Conference signified its full approval of the movement and, in 1888, the present system of permanent deaconess work was inaugurated under the direction of the Woman's Home Missionary Society. According to the rules of conduct the purposes of the deaconesses are "to act as pastors' assistants; to visit from house to house; to assist in evangelistic work; to conduct meetings, especially those for women and children; to conduct kindergartens, kitchen-gartens; and other industrial and educational schools; to visit in prisons and police stations; to conduct orphanages, hospitals and other institutions of mercy; to nurse among the sick poor, etc., and to assist in office and clerical work." The Deaconess Society of the Methodist Episcopal Church was organized in 1895. It conducts hospitals, orphanages, and schools, as well as other charitable works under the direction of its licensed deaconesses. The German Methodist deaconess homes and hospitals are under the control of the German Central Deaconess Board. The work of its deaconesses comprises, beside hospital service, nursing in private families, parish work, free dispensaries, kindergartens, industrial and sewing schools, etc. It has 78 deaconesses who operate five hospitals. The "Martha-Maria" Deaconess Society in Germany, which now operates in association with the Bethany Society, was originally organized by the Wesleyan Church. While now in perfect harmony with the sister institutions it still maintains its distinctive organization. Except in some few instances in the Protestant Episcopal Church the present-day deaconesses take no vows and may withdraw from the service of the Church at any time without reproach to themselves. They are usually disciplined during two probationary years, and, while they are unsalaried they are assured of ample support, with a good home and tender care during sickness or old age. It is now customary in the United States for deaconesses to wear a habit, chiefly for purposes of recognition and protection, and, generally, they now live in communities or homes.

JOHN R. MEADER,  
(*American Almanac.*)

**Orders (Royal) and Decorations of Honor.** The desire to possess honorary distinctions has shown itself in one form or another since the earliest days of civilization. The ambition to wear something that shall distinguish one from one's fellows is scarcely stronger to-day that it was when the Egyptians, Assyrians, Persians, Greeks and Romans were the great nations of the earth. In the old days rings, gold chains, belts, "triumphal gifts," etc., conferred the distinction on personal merit as discriminated from official rank and hereditary nobility, but the ribbons, chains and jeweled badges of later centuries convey the same meaning and the privilege of wearing them is prized as highly as if they had never been ridiculed as foolish forms of masculine vanity. It was the appreciation of this sentiment that influenced Napoleon in the institution of the "Arms of Honor." In vain old republicans, jealous of their new prerogatives, protested against what seemed like the re-establishment of a "gewgaw of vanity," suitable perhaps for an effete monarchy but unworthy of the serious consideration of citizens of a new republic. The Consul



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however, was not to be dissuaded. "You call them toys?" he answered, "Well, learn that it is through such toys that men are led!"

Concise stated, the organized and duly constituted bodies of knighthood are of two classes: (1) the associations, or fraternities, possessing property and rights of their own as independent bodies, and (2) honorary associations established for specified purposes by sovereigns within their respective dominions. To the former belong the three great religious orders created during the Crusades, the Templars, the Hospitallers, and the Teutonic Knights. (See **ORDERS, RELIGIOUS.**) To-day the strictly religious orders are comparatively extinct, but the more secular orders which they inspired exist under almost every flag, Switzerland being the only nation of importance which has nothing that resembles an order of distinction.

The Knights Hospitallers of St. John the Baptist in Jerusalem, afterwards known as the Order of Saint John of Malta, formed the most powerful of all the religious orders. It was about the middle of the 11th century that the organization had its inception, when a number of merchants from Amalfi erected a large hospital on the spot where, according to tradition, the "Last Supper" had been held. In 1104 these Pilgrims of the Hospital were constituted Knights by Baldwin I., and their rule, which was that of Saint Augustine, was confirmed by Pope Pascal II., in 1113. Driven from Jerusalem, and afterward, from place to place by the martial vicissitudes of the times, they finally seized upon the Island of Rhodes, which they retained until 1522, when, upon being expelled, they went to Malta, which, with Gozo and Tripoli, was granted to them in fee by Emperor Charles V., in 1530. During the period of the Reformation, as well as in subsequent years, the Order was abolished in some portions of the country, and, in 1798, having been dispossessed from Malta by Napoleon, the Knights settled in the Papal States, from which headquarters the Order has been to some extent revived. Originally the Order maintained a class for women, "The Ladies of the Order of Saint John," which was founded by Agnes, Abbess of the House of Saint Mary Magdalen, in 1099.

Of the early fraternities, the Order of the Holy Sepulchre was one of the most ancient. Sometimes, but probably erroneously, attributed to Saint Helena, it is generally believed that this Order was instituted by Baldwin I., King of Jerusalem, about the year 1110. As originally founded it was restricted to the priesthood and this restriction was not removed until 1484, when Pope Innocent VIII. incorporated it with the Order of the Knights of Saint John of Jerusalem. Two ineffectual attempts were made to sever the bond of union, but in 1496, Pope Alexander VI., who took so much interest in the Order that he may almost be regarded as its real founder, transferred the power of admitting Knights to the Holy See, and, from that time, the Order was changed from a religious association to a fraternity of chivalric character.

The Templars originated about 1120, under Baldwin II., when nine gentlemen and two nobles appeared as Pilgrims at Jerusalem. Adopting the rule of Saint Augustine they took up their abode in the Holy City, and gradually extended their influence until they became one

of the most powerful confraternities, under the name of "Brethren of the Militia of the Temple." In an evil hour, however, they incurred the animosity of Philip le Bel and of Pope Clement V., and, in the year 1312, the latter announced the suppression of the Order in France. Although it is still doubtful whether the action of Pope Clement was just or unjust, his example was followed by the whole of Europe, and the final blow was struck when the last Grand Master, Jacques de Molay (q.v.), was executed at the stake, in France, in 1313. The Order has never been revived.

The Teutonic Order, the last of the great religious fraternities, was founded at Jerusalem, in the 12th century. Prior to its organization German pilgrims had received scant attention at the Holy City. Needy pilgrims from France and Italy found the Templars and the Hospitallers ready to receive them, so this new Order was formed with the object of attending to sick and wounded Germans. In 1191 Frederick of Swabia gave the Order a constitution which established the rule of Saint Augustine and adopted regulations governing the practice of all duties. Regarding the treatment of the sick and the poor the regulations were similar to those of the Knights of St. John, while the regulations respecting peace and war were identical with those of the Templars. With the sanction of Pope Celestine III., Frederick gave the association the name of "The Order of the German House of the Holy Virgin at Jerusalem."

The Teutonic Order achieved the height of its power soon after its renovation, in the 13th century, but this period of luxury was followed by one of anarchy, and, in the 15th century, after the Twelve-Year war, it became feudatory to Poland. After the Peace of Cracow, 1525, the original Order was abolished and its territories were given as fief of Poland to the Grand Master Albert, Margrave of Brandenburg, who assumed the title of "Administrator in Prussia and Grand Master of the Teutonic Order in Germany," and this condition continued, with various interruptions, until 1805, when, at the Peace of Presburg, the Emperor of Austria was invested with all the rights, dignities, etc., appertaining to the Grand Mastership. Four years later, however, Napoleon abolished the Order in the Rhenish Province and apportioned all its lands among the neighboring princes, but the Congress of Vienna restored most of the property and, eventually, in 1840, an Imperial decree declared it an independent fief of the Austrian Empire.

At the head of the great secular orders which still maintain their pristine reputation stands the Most Noble Order of the Garter, membership in which is still restricted to English and foreign royal and imperial personages and to such peers of the realm as it may be desirable to recognize. Next in rank and antiquity is the Order of the Golden Fleece, which is not only the most important of the Austrian Orders but which is the principal decoration of the Spanish crown. Founded by Philip, Duke of Burgundy, in 1429, the Grand Mastership remained in his house until Charles the Bold died without male issue, when it passed to Emperor Maximilian of Germany, the son-in-law of the Duke. When the House of Hapsburg ceased to rule in Spain, at the beginning of the 18th

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century, the Golden Fleece became the subject of a violent quarrel. The new king insisted that the Order was a possession of Spain, while the Hapsburgs, as represented by the German Emperor, refused to relinquish the honor, claiming that it belonged exclusively to their House. There the matter rested, for while both claimants still persist in exercising the right to bestow the Order no person who has received the Fleece from the hands of Spain is permitted to display the insignia at the court of Austria.

The third of the great mediæval Orders is that of the Most Sacred Annunziata, the principal order of Italy, which was created by Amadeus of Savoy in 1362. Called by Favin, "the Order of the Snares of Love," and known at various periods as "the Collar" and "Love-knots," for the reasons for which one must turn to tradition, its importance is indicated by the fact the its chevaliers are styled "cousins of the King," all of whom, with their wives, participate in the honor of this relationship to royalty.

The only insignia of distinction ever authorized by the Congress of the United States are the medals of honor for exceptional bravery in war and for life saving, which from time to time have been sanctioned by the government. France, too, continues to show a distaste to chivalric orders and remains satisfied with its republican decoration, the Legion of Honor, which, however, is not nearly so closely restricted as are the awards of honor made by the United States.

The following is a complete list of the Orders and other decorations worn by the citizens of the various nations of the world, those which are sometimes worn but which are no longer conferred being specified:

**ABYSSINIA.**—The Order of Solomon's Seals, also known as the Order of Saint George, was founded by Emperor John in 1874. The Emperor also confers a decoration known as the Order of the Star, but it is impossible to learn the date of its origin or to discover authentic data respecting its history.

**AUSTRIA-HUNGARY.**—The chivalric Order of the Golden Fleece which was founded by Philip the Good, Duke of Burgundy, 10 Jan. 1429, and was extended under the statutes of 27 Nov. 1840, is regarded as of such importance as a dignity that its knights have precedence over all others at court functions, both in Austria and in Spain. The military Order of Maria-Theresa was founded 13 May 1757, by Empress Maria Theresa, as a recognition of officers distinguished in war. It is of three classes, the third, or Commander's Class, having been added by Emperor Joseph II. The Order of Saint Stephen of Hungary, which was originally intended to be the National Order of Hungary and its most important reward for civil merit, was founded by Maria Theresa, 5 May 1767. While the Order of the Iron Crown was founded by Napoleon, in his capacity of King of Italy, on 5 June 1805, and originally bore the title of "Ordine della Corona di Ferro," it was extinguished in 1814, and was not re-established until two years later, when, 12 Feb. 1816, Emperor Francis I. assumed the office of Grand Master and declared it to be inseparably united to the Imperial Crown of Austria, a circumstance which has led several authorities to hold that it should be regarded as a new order rather than the revival of an old one, especially as both the form of its decoration and its statutes have been changed. The Order, which now comprises three classes, is open to personal merit without other qualification. The Order of Leopold, was founded by Emperor Francis I. 7 Jan. 1808, the day after his marriage to Louise of Austria-Modena. It is a distinction for personal merit solely. The Order of Francis Joseph, a reward for distinguished merit in all classes, was founded by Emperor Francis Joseph I. 2 Dec. 1849. The Military Foundation of Elizabeth Theresa was created by Empress Elizabeth Christine, widow of Emperor Charles VI., and was rejuvenated by Empress Maria Theresa in 1771. The Teutonic Order has already been described. Austria-Hungary also possesses two orders to which women only are admitted. The older, the Order

of the Starry Cross, was founded upon religious principles by the Dowager Empress Eleanor, widow of Emperor Ferdinand III. 18 Sept. 1668, under the name of "The Order of the Community of Noble Ladies of the Starry Cross." The second, the Order of Elizabeth, was instituted by Emperor Francis Joseph 17 Sept. 1898, soon after the assassination of his wife. It is intended as a reward of merit for women who have achieved distinction in the various professions. The less important Austrian decorations are: The Cross of Merit for ordinary soldiers, founded by Emperor Francis II. 23 Nov. 1801, and the Cross of Merit for officers, created by Emperor Francis Joseph 22 Nov. 1849. By a statute adopted 7 July 1874, it was provided, in the case of the latter order, that after the death of the person decorated the decoration should revert to his heirs. The Medal of Honor of Austria-Hungary is the decoration bestowed upon those who excel in the arts and sciences. It was founded on 18 Aug. 1877 by Emperor Francis Joseph, while the Souvenir Medal of the Jubilee was created by Emperor Francis Joseph on 18 Aug. 1898.

**BELGIUM.**—Belgium possesses but few orders: The Order of Leopold, civil and military, which was founded by King Leopold I. 11 July 1832; the Order of the Iron Cross, a civil decoration, which was founded 21 July 1867, but which originated in the Decoration of Honor, or Order of Civil Merit instituted by the National Congress of Belgium in 1830, and the Military Cross of two classes which was instituted 11 Feb. 1885. Of the five classes which are included in the Order of Leopold the three inferior classes carry pensions.

**BOLIVIA.**—The insignia of the Order of the Cross of Christopher Columbus, which was founded in 1892, is still worn, but the Order is no longer conferred. (Three classes.)

**BOKHARA.**—The reigning Ameer of Bokhara still confers three Orders, that of Alexander III., founded in 1898; the Order of the Crown of Tashd, founded in 1886 and afterward sanctioned by Russia, and the Order of the Star of Bokhara, in three classes, instituted in 1860.

**BRAZIL.**—Although all the Brazilian decorations with the exception of the two medals of merit were suppressed by the Constitution of 1891, the following practically extinct Orders are sometimes referred to: The Imperial Order of the Southern Cross, founded 1 Dec. 1822 by Emperor Pedro I., the Order of Pedro I., founded 16 April 1826 by Emperor Pedro I., and re-organized by his son 19 Oct. 1842; the Imperial Order of the Rose, founded 17 Oct. 1829 by Emperor Pedro II., the Order of Christopher Columbus, created 6 June 1890, and the Medal of Merit, which was founded 15 Dec. 1889. In addition to these the sovereigns of Brazil formerly conferred the decorations of the Orders of Christ, Saint Benoit of Aviz, and Saint James of the Sword, all of which were of Portuguese origin and were adopted as Brazilian Orders 9 Sept. 1843.

**BULGARIA.**—By the force of circumstances the orders possessed by Bulgaria must be of extremely recent origin, but all are distinguished by the fact that they are conferred for individual merit only, either for bravery in time of war, or for meritorious achievements in the arts and sciences. The oldest, the Military Order of Bulgaria, for bravery in time of war, was founded 17 April 1879 by Prince Alexander. It includes a grand cross and four classes for officers and four classes for soldiers. The Order of Alexander, to which is added the Medal of Merit with sword of honor for officers, and the Medal of Merit, in three classes, was founded 25 Dec. 1881 by Prince Alexander I., and extended 14 Aug. 1888 by Prince Ferdinand. The Medal of Merit for distinction in the arts and sciences was founded by Prince Alexander 24 March 1883. Both the Order of Civil and the Order of Military Merit were instituted by Prince Ferdinand. The former was founded on 14 Aug. 1891; the latter 30 May 1891. The Military Cross, the reward for military service rendered faithfully for twenty years, applies to private soldiers as well as to officers, the medals for officers being of silver, while those for the privates are of bronze.

**CHINA.**—The only order which is bestowed in China is that of the Imperial Dragon. It was instituted in 1862, under the name of the "Order of the Precious Star," its purpose being the reward of foreigners who performed valuable services for the Empire. In some respects it was modeled after the British Order of the Bath, and the British General (then Colonel) Gordon, who suppressed the Taiping Rebellion, was the first person who received the decoration. For many years the Order was not again conferred, but 7 Feb. 1882 it was re-organized by Emperor Kouang-su, and has since been known as the Order of the Double Dragon. It possesses five classes, the first three being

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subdivided into three grades each, and it is carefully specified to what character of person each grade shall apply, the distinctions, which range from "sovereigns" to persons of "the commercial class," being distinguished by the different kinds of stones set in the insignia.

**DENMARK.**—Although Denmark confers many medals it possesses only two orders, but both are of great antiquity. The Order of the Elephant, for example, is so ancient that its origin is lost in tradition. By some it has been attributed to the period of the First Crusade, by others to Canute VI., in the 12th century, while still others refer its institution to the 15th century, when it is supposed to have been founded by Christian I. If the Danish authorities are to be relied upon, however, the part played by Christian I. in the history of the Order was that of *restorer* rather than of *founder*, for they insist that it was originally of a religious character, having been known as the "Society and Fraternity of the Holy Virgin Mary," and that he re-organized it. It is at least certain that it was again renovated 1 Dec. 1693, when Christian V. altered its statutes, making profession of the Evangelical religion one of its requirements, and gave it the name it bears to-day. The Order of Danebrog, which is conferred only upon Danes, also makes claim to a record of great antiquity, as it is said to have been instituted by Waldemar II. in 1219 in commemoration of a miraculous intervention in battle, when the appearance of a flag, red with a white cross, in the heavens revived the courage of the Knights of the Sword and inspired their subsequent victory. At the time of the renovation of the Order of the Elephant this Order was also re-organized by Christian V. and 29 June 1808 it was changed from a court honor to an honor of merit, unrestricted as to age, rank or the number of members, by King Frederick VI. The Danish medals are: Medal for Life-saving, founded 29 Aug. 1798; Medal of Merit, founded by King Christian VIII. 24 July 1845; Medal of Reward, founded by King Christian IX. 26 May 1886; Medal of Arts and Inventions, founded 31 Aug. 1841 by King Christian VIII., and the Military Medals awarded to the non-commissioned officers of the army and navy for the wars of 1848-50 and 1864.

**FRANCE.**—In addition to the Order of the Legion of Honor, which was founded by Napoleon 19 May 1802, France has the following medals of decoration: The Military Medal, founded by Napoleon III.; the Medal of Honor, founded by President McMahon; the Medal of Merit, agricultural, founded by President Grévy; the Colonial Medal, founded in 1893, for military services in the colonies and countries under the protection of France; the Medal of Honor, created by decree in 1897; the bronze Medal of Reward for bravery in the performance of duty, founded in 1899, and the Medal of Honor, in silver, for commercial workmen, founded by decree in 1900. The French orders which are no longer conferred are: The Order of the Holy Ghost, founded in 1578 by King Henry III.; the Order of Saint Michael, founded 1 Aug. 1469 by King Louis XI.; the Order of Saint Louis, founded as a reward for military bravery by King Louis XIV. in 1693, and the Order of Saint Hubert, founded 31 May 1416, by Louis I., Duc de Bar. The colonial orders are as follows: Anjou, Order of the Star; Annam, Order of the Dragon; Cambodia, Royal Order of Cambodia, instituted by Sultan Nur-ed-din 8 Feb. 1864; Dahomey, Order of the Black Star, instituted by King Toffa in 1894 and recognized by the Grand Chancellor of the Legion of Honor; Tajurah, Order of Nishan-el-Anuar; Tunis, Order of the Husseinite, founded by Sultan Sadi Ahmed Bey; Ahed el Aman (two classes), founded by Bey Mohamed al Sadak 1859, and Nishan el Iftikhar (six classes), founded by Sultan Sadi Ahmed Bey 1850.

**GERMANY.**—The German orders are numerous, every kingdom, principality and duchy of the Empire having a multitude of its own, to all of which, with possibly a few exceptions, the Emperor belongs. The orders of Bavaria are among the most ancient, some claiming to have been introduced from the Holy Land during the Crusades, and yet, in matter of importance of its orders, Prussia takes precedence. The Order of the Black Eagle is the greatest, as, to be eligible, one must be able to show a lineage on both sides of the house for at least four generations. The following is a list of the German decorations:

**Anhalt.**—Order of Albert the Bear (five classes and two medals), created 4 April 1807 by Grand Duke Charles Frederick. On 29 April 1901 the Order was extended by Duke Frederick of Anhalt by the creation of a crown for distinguished services. The Order of Merit, for success in the arts and sciences, was created by Duke Frederick of Anhalt 30 July 1873.

**Baden.**—The Family Order of Loyalty, or Fidelity, was created 17 July 1715 by Margrave Charles William

of Baden-Durlach. The Order of Military Merit of Charles Frederick was created 4 April 1807 by Grand Duke Charles Frederick. The Order of the Lion of Zahringen (five degrees) was founded 26 Dec. 1812, by Grand Duke Charles in memory of the baptismal day of his consort. The Order of Berthold I. was formerly the title of the class of the Grand Cross in the Order of the Lion of Zahringen, but was proclaimed a separate order by Grand Duke Frederick 9 Sept. 1896. The other decorations of Baden are: The Military Medal of Merit of Charles Frederick, in gold and silver, founded 4 April 1807; a Cross commemorative of the campaign of 1870-1, created 25 June 1871 by Grand Duke Frederick; Cross of Merit of the Lion of Zahringen, founded by Grand Duke Frederick 29 April 1889; Medals of Merit for Life-saving, in gold and silver, created by Grand Duke Charles Frederick and Grand Duke Frederick; the Distinction for long service in the active army, created by Grand Duke Leopold 18 Feb. 1831, and the Medal commemorative of the suppression of the revolt in Baden, 1849, created by Grand Duke Leopold 29 August of that year.

**Bavaria.**—Bavaria possesses several extremely ancient orders. The Order of Saint Hubert was founded by Gebhard V., Count of Ravensberg, in commemoration of his victory over Count Arnold of Egmont, in 1444. It is an order that is conferred only upon royal personages and is one of the highest decorations in the Empire. The chivalric Order of Saint George is usually accredited to the Elector Charles Albert, 1729, but Bavarian authorities claim that it was introduced from the Holy Land early in the 12th century, that it was extended by Maximilian I., and that it was merely renovated by the Elector. It is conferred only upon Roman Catholics and even then only upon those having no other order. The Military Order of Maximilian was created by the Elector Charles Theodore 8 June 1797, and 1 Jan. 1806, the day he assumed his royal title, it was raised from a military decoration to royal rank by King Maximilian Joseph. As an order it ranks high, the possession of either of its three classes conferring nobility. The civil Order of the Crown of Bavaria was created 19 May 1808 by King Maximilian Joseph. It was instituted as recognition of civil merit, but possession of either of its four classes confers nobility. The Order of Saint Michael, instituted as a distinction for civil merit for Roman Catholics of noble descent, was created by Joseph Clement, Elector of Cologne and Duke of Bavaria 29 Sept. 1693. It has since undergone many modifications. The Maximilian Order, instituted as a recognition of success in the arts and sciences, is conferred only upon Germans. It was founded 28 Nov. 1853 by King Maximilian II. and was extended by Luitpold, Prince Regent, 18 Dec. 1886. The Order of Military Merit (six classes) was founded 19 July 1866, by King Louis II., and the Royal Louis Order, conferred only upon those who hold the title of "Counsellor," was created 25 Aug. 1827, by King Louis I. There are four Orders in Bavaria which are confined to women. They are: The Order of Theresa, founded by Queen Theresa 12 Dec. 1827; the Order of Saint Elizabeth, founded for ladies of Roman Catholic faith by the Electress Elizabeth Augustine 12 Oct. 1766; the Order of Saint Anne, provided for ladies of nobility of Munich, all of whom receive pensions, was founded by the Electress Anne-Maria-Sophia 6 Dec. 1784, and the Order of Saint Anne for ladies of Würzburg, was established by the Elector Maximilian Joseph 12 July 1803. The other Bavarian decorations are as follows: The Medal of Saint George, founded 15 Dec. 1889 by Prince Luitpold, Regent of Bavaria; the Medal of Louis for achievements in the arts, sciences and industries, founded by King Louis II. 25 Aug. 1872; the Medal for Life-saving, founded by Prince Luitpold 27 Feb. 1889; the Medal of Honor for Voluntary Services rendered to sick persons, founded by Prince Luitpold 5 March 1901; the Cross of Merit for Firemen, created by Prince Luitpold 5 March 1901, and the Cross of Merit, for women, created by King Louis II. 13 May 1870.

**Brunswick.**—The Order of Henry the Lion was instituted as a reward of distinction for military and civil service as well as for achievements in the arts and sciences. It was founded by Duke William 25 April 1834, and has been extended several times until it now includes five classes and one Cross of Merit in two classes. The other decorations of Brunswick are: A Medal for Life-saving, founded 25 April 1836 by Duke William, and a Medal commemorative of the campaign of Schleswig-Holstein, 1848-9, founded 8 May 1801 by Prince Albrecht of Prussia.

**Hesse.**—The Electoral Orders of Hesse are no longer conferred. They consist, however, of the Order of the Golden Lion, founded by the Landgrave Frederick II. in 1770; the Order of Military Merit, founded

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in 1669 by the Landgrave Frederick II., and the Order of the Iron Casque, founded 18 March 1814 by the Elector William I. The Grand Ducal Orders of Hesse are still conferred and recognized. They are: The Order of Louis, for civil and military merit, founded by Grand Duke Louis 25 Aug. 1807; the Order of the Golden Lion, conferred only upon persons of princely rank in the House of Hesse, founded by Landgrave Frederick II. 14 Aug. 1771; the Order of Merit of Philip the Good, founded 1 May 1840 by Grand Duke Louis II. The other decorations are: A Cross of Military Merit, founded 12 Sept. 1870 by Grand Duke Louis III.; the Order of the Military Sanitary Cross, a reward for those, irrespective of sex, who attend the sick or wounded soldiers, founded 25 Aug. 1870 by Grand Duke Louis III.; a Cross for distinguished services to the sick, created by Grand Duke Louis IV. 18 April 1891; a Medal of Merit for the arts, sciences, industries and agriculture, founded 21 May 1853 by Grand Duke Louis III.; a Medal for Life-saving, and a General Medal of Honor, founded 14 Nov. 1849 by Grand Duke Louis III.

**Hohenlohe.**—The Order of the Phoenix of the House of Hohenlohe is self-conferring and perpetual with the permission of the sovereign. It was founded 29 Dec. 1757 by Philip Ernest I., Prince of Hohenlohe-Waldenburg-Schillingfurst, and was created with new statutes in 1795 by Prince Leopold of Hohenlohe-Bartenstein.

**Lippe and Schaumburg-Lippe.**—The Cross of Honor of Lippe was founded in common by Prince Leopold of Lippe and Prince Adolph of Schaumburg-Lippe 25 Oct. 1869. In Lippe it consists of four classes with one Cross of Merit; in Schaumburg-Lippe of five classes and one Cross. The other decorations of Lippe are: "The Rose of Lippe," a distinction for the arts and sciences; Civil and Military Medals of Merit, and a Medal for Life-saving.

**Mecklenburg-Schwerin and Strelitz.**—The Order of the Crown of the Wendes of the House of Mecklenburg was founded in common by Grand Duke Frederick Francis II. of Mecklenburg-Schwerin and Grand Duke Frederick William of Mecklenburg-Strelitz 12 May 1864. It consists of three classes and one Cross of Merit, the highest class being open to ladies of exalted rank, 96 being selected from Schwerin and 32 from Strelitz. Mecklenburg-Schwerin also confers the Orders of the Griffin, established 15 Sept. 1884 by Grand Duke Frederick Francis III. as well as the following minor decorations: A medal in gold and silver, instituted in part for the arts and sciences and in part for "brave men and good citizens," created by Grand Duke Frederick Francis I., a Medal of Merit, created by Frederick Francis II. 28 Feb. 1859; medals for life-saving and merit, created by Grand Duke Frederick Francis III. 19 March 1885; a Medal of Honor for life-saving during times of flood, created by Grand Duke Frederick Francis III. 21 June 1888; Medals in memory of Grand Duke Frederick Francis III, instituted by the Duke Regent, Jean Albert, 21 April 1807; a Cross of Military Merit, created 5 August 1848; a Cross of Military Service for officers and employees of the army; a Cross for non-commissioned officers; a Medal for Service in the "landwehr"; a Military Medal commemorative of the campaign of 1848, and Medals for members of the ancient military corporations, founded by Duke Regent John Albert 2 Dec. 1889.

**Oldenburg.**—The Order of Merit of the Ducal House of Peter Frederick Louis, founded by Grand Duke Paul Frederick August, in memory of his father, 27 Nov. 1838; a Medal of Merit for life-saving, created 17 Jan. 1848, and a Cross of Merit for devotion and fidelity in time of war, founded by Grand Duke Peter 12 July 1871.

**Prussia.**—Although the Orders of Prussia are not of great antiquity several of them rank high among the decorations of the world. The Order of the Black Eagle, which was founded by King Frederick I. 17 Jan. 1701, in commemoration of his coronation, is one of the most important. Its membership is limited to 30 knights, exclusive of princes of royal blood, and all must prove noble descent for not less than four generations. The Order of the Red Eagle was created 17 Nov. 1705 by George William, Crown Prince of Brandenburg-Baireuth, as the "Order of Sincerity." In 1712 it was organized as an order of the House of Hohenzollern; was reorganized as an order of five classes by William I. 18 Oct. 1861, and was extended by the addition of a royal crown to the crosses of all classes by William II. 12 June 1892. The Order of Civil and Military Merit was created in 1667 by the Prince Elector Frederick as the "Order of Generosity." In 1840 it was reorganized by Frederick II. as the "Order for Merit"; in 1810 Frederick William III. made it an order of Military Merit, and 21 May 1842 William IV. extended it to the civil class for science and arts, to include 30 Germans and

an equal number of foreigners. The Royal Order of the House of Hohenzollern was founded by Prince Frederick of Hohenzollern-Hechingen in common with Prince Charles of Hohenzollern-Sigmaringen 5 Dec. 1841; the Order of the Crown of Prussia was created as an Order of Merit by William II. 18 Jan. 1901; the Royal Order of the Crown was founded by William I. in commemoration of his coronation 18 Oct. 1861; the Order of the Iron Cross was created by Frederick William III. 19 March 1813, and the Order of William was founded by William II. 18 Jan. 1896. The Order of Louise, which is bestowed upon women in recognition of service in war, was founded by Frederick William III. 3 Aug. 1814, and the Cross of Merit for women was created by William I. 22 March 1871. In 1812 the new Commandery of Brandenburg of the Order of Saint John of the Hospital of Jerusalem, a "Royal and Protestant Order of Saint John" into which the knights of the abolished Order were received, was founded by Frederick William III., and in 1852, it was reorganized by Frederick William IV. Other decorations conferred by Prussia are: The Medal of Benevolence with ribbon, created by Frederick William III. 16 Aug. 1833; the Medal of the Red Cross, founded by William II. 18 Jan. 1896, and the Cross of the Medal of Honor, founded by William II. 27 Jan. 1900.

**Reuss, Senior Branch.**—The only decoration is the Cross of Honor created by Prince Henry XX. 15 Sept. 1858. The Junior branch bestows five decorations: The Cross of Merit, founded by Prince Henry XVII. 20 Oct. 1857; the Cross of Honor, founded by Prince Henry XIV. 24 May 1869; the Cross of Merit for the arts and sciences, created by Prince Henry XIX. 23 May 1885, and the Medal for Life-saving and the Medal of Honor for 30 years of faithful service, both of which were founded by Prince Henry XIV. 1 April 1896.

**Saxony (Royal).**—The Order of the Rue Crown of the House of Saxony, instituted at the suggestion of Napoleon at the time of Saxony's elevation to a kingdom was founded by King Frederick Augustus I. 20 July 1807; the Military Order of Saint Henry was founded by the Elector Frederick Augustus II. 7 Oct. 1736; the Order of Merit was created by King Frederick Augustus I. 7 June 1815; the Order of Albert the Valorous, for merit in science and art and for civil virtue was founded by Frederick Augustus II. 31 Dec. 1850, and the Order of Sidonia, for women, as a reward for services during war, was created by King John 6 May 1871. In addition, the Royal House of Saxony confers a Medal for Honor, created 31 Jan. 1876 by King Albert; the Medal of Carola, founded 17 Sept. 1892 by King Albert, and a Medal for Life-saving, created in 1831. (Ducal) The Grand Ducal House of Saxony confers the following decorations: The Civil and Military Order of Vigilance or of the White Falcon of the House of Saxe-Weimar, founded 2 Aug. 1732 by Duke Ernest Augustus; a Medal of Honor for great achievements during the war of 1870-1, founded 19 July 1871, by Grand Duke Charles Alexander; a Medal of Merit, with sword, and medals of recognition of the arts and sciences, founded by Grand Duke Charles Alexander, 25 Aug. 1892; a Medal for Life-saving, founded 24 June 1881; a Medal of Honor for Firemen, founded 22 Nov. 1890; a Distinction for non-commissioned officers and soldiers, created 9 March 1872, and a Medal of Honor for women, founded by Grand Duke Charles Alexander 30 Dec. 1900. (The Duchy) The Order of the House of Ernestine was created in 1691 by Duke Frederick I. of Saxe-Gotha-Altenburg, under the name of "The Order of German Integrity." It is the reward of high ducal functionaries and its qualifications are chiefly administrative and executive service.

**Saxe-Altenburg.**—A medal for arts and sciences, founded by Duke Ernest in 1871.

**Saxe-Coburg and Gotha.**—A Cross and Medal of Merit for the arts and sciences, founded 27 Jan. 1869; a medal for Life-saving, founded 1 May 1883; the Medal of Duke Ernest, founded 27 Feb. 1888; the Medal of Duke Alfred, founded 1 Jan. 1896, and the Medal commemorative of the silver wedding of Duke Alfred, created 23 Jan. 1890.

**Saxe-Meiningen.**—A Cross of Merit and a Medal of Merit for the arts and sciences, created by Duke George 25 July 1874.

**Schwarzburg-Rudolstadt.**—Two medals of merit, each of two classes, created by Duke Gonthier 8 Feb. 1899.

**Schwarzburg-Sondershausen.**—A medal for life-saving, created in 1868; a Medal of Honor for Firemen, created 11 June 1895, and a Medal of Honor for servants and workmen who have completed 40 years of active service in the same house or with the same establishment, founded by Prince Charles Gonthier 20 Oct. 1896.

**Schwarzburg-Rudolstadt-Sonderhausen.**—The Cross

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of Honor of Schwarzburg was created 20 May 1853 by Prince Frederick Gonthier for the Principality of Schwarzburg-Rudolstadt and was changed, 28 May 1857, to include both principalities of Schwarzburg.

**Waldeck.**—The Order of Civil Merit was founded 3 July 1857 by Prince George Victor; the Cross of Military Merit for officers was created 14 June 1854, and the Cross of Honor and Medal for the arts and sciences was founded in 1899.

**Württemberg.**—The Order of the Crown of Württemberg, which confers personal nobility upon civilians, was created by King William I. 23 Sept. 1818 by the union of two older orders, the Order of the Eagle and the Order of Civil Merit, instituted by Frederick I. in 1806; the Military Order of Frederick was founded 1 Jan. 1830 by King William I., the Order of Military Merit was created by Duke Charles Eugene 6 Nov. 1806. The Order of Olga, for ladies, was created by King Charles X. 27 June 1871, in honor of his queen, and the Medal of Charles-Olga, founded by Queen Olga in 1889, was merged in the Order of Olga in 1893, making the decoration apply to both sexes. A Medal of Merit (1892), a Military Medal, a Medal for Life-saving (1897), and a Cross of Merit (1900) are also conferred.

**GREAT BRITAIN.**—The English order of highest distinction is, of course, the Order of the Garter, a decoration which owes its origin to King Edward III., who is said to have founded it about 1350. While this is a matter of record, however, all other facts in regard to the institution of the Order are "wrapped in mystery," and it will never be known decisively whether King Edward's desire was to revive the glories of the Round Table, to justify his claim to the throne of France, to commemorate the victory of the Black Prince at Crécy, or to bruit abroad his devotion to a lady. Edward himself announced that the Order was founded in honor of the Holy Trinity, the Virgin Mary, Saint George of Cappadocia, and Saint Edward the Confessor, and he instructed his Knights Companions to wear the Garter at all times, to be present at Windsor each Saint George's Eve in order to make offerings of prayers and money in the chapel; on the following day to participate in the annual festival, and, for certain days thereafter, to be ready to meet all worthy comers in the lists for the honor of the Order and the glory of its patrons. The Order of Saint John of Jerusalem was introduced into England during the 12th century, or about 1330. When the Order was divided into seven languages England received the sixth place, but the organization received comparatively little attention until 1830, when it was revived and, in 1888, it was again reorganized, this time under a royal charter. The Order of the Bath, which was founded by King Henry IV. in 1399 as a distinction for civil and military services, is also one of Great Britain's proudest orders. It owes its peculiar name to the fact that in olden times the taking of a bath constituted one of the most important features of the investiture of the knights. The Order of the Thistle, otherwise known as the Order of Saint Andrew, which is bestowed only upon Scottish peers, claims to have originated in the year 787; in 1687 it was re-established by King James VII. of Scotland (James II. of England). The Order of Saint Patrick is to Ireland what the Thistle is to Scotland, and included in its membership the leading Irish peers. It was founded 5 Feb. 1783 by King George III. The Order of Saint Michael and Saint George is of even more recent origin and has generally been identified with the colonial interests of Great Britain. It was founded by King George III. 27 April 1818. Other British Orders and decorations are: The Order of the Star of India, founded by Queen Victoria 23 Feb. 1861; the Order of the Indian Empire, founded by Queen Victoria 1 Jan. 1878; the Distinguished Service Order, for the reward of individual instances of meritorious service in war, was founded by Queen Victoria 6 Sept. 1886; the Victoria Cross, for distinguished service in war, founded by Queen Victoria 29 Jan. 1856; the Albert Medal, founded 7 May 1886; the Royal Order of Victoria, founded by Queen Victoria, for personal services rendered, 23 April 1896; the Royal Order of Victoria and Albert, founded by Queen Victoria, for women, 10 Feb. 1862; the Imperial Order of the Crown of India, founded by Queen Victoria, as a recognition of the services of women nurses, 31 Dec. 1877; the Order of the Red Cross, for women only, founded by Queen Victoria 23 April 1883, and the Cross of Merit, for distinguished services rendered in time of war, founded by King Edward VII. 15 June 1901. The Military Order and Order of Merit of British India was instituted in 1837 to reward meritorious service in the native army of India. The decoration is of two classes, one carrying the title of "Sirdar Bahadur," and the other that of "Bahadur."

**GREECE.**—The only order bestowed by Greece is the Royal Order of the Saviour, or of the Redeemer,

which was founded by the General Assembly of the Hellenes, in commemoration of the deliverance of Greece, 12 Aug. 1829. It is conferred for all kinds of distinctions.

**HAITI.**—The two Haitian Orders, which are no longer conferred, are the Order of Saint Faustin, founded by President Soulouque in 1852, and the Order of the Legion of Honor.

**HANOVER.**—The Orders of Hanover, which are no longer conferred, are: The Order of Saint George, founded and declared the Order of the House of Hanover by King Ernest Augustus 23 April 1839; the Order of the Guelphs, created 12 Aug. 1815 by Prince George, afterward King George IV.; the Order of Ernest Augustus, founded 15 Dec. 1865 by King George V.; a medal for the arts and sciences, founded 30 April 1843, and a Medal of Merit for life-saving, founded 8 Aug. 1845 by King Ernest Augustus.

**HAWAII.**—The Hawaiian Orders, which are no longer conferred, are: The Order of Kamehameha I., instituted 11 April 1865; the Order of Kalakaua I., founded 12 Feb. 1875; the Order of the Royal Crown of Hawaii, instituted 12 Sept. 1882; an Order and a Medal of Kapiolani, created 30 Aug. 1880, and the Order of the Star of the Ocean, founded 16 Dec. 1886.

**HONDURAS.**—The chivalric Order of Saint Rose and of the Civilization of Honduras, which was created by President Medina 21 Feb. 1868 is no longer conferred.

**ITALY.**—The Order of the Annunziata, which ranks third in the list of orders, consists of but one grade, which, it is claimed, was created by Amadeus VI. of Savoy 1362, in commemoration of the exploits of his predecessor, Amadeus V., at Rhodes. It was revived 11 Sept. 1815 by Charles III. and was again modified by Victor Emmanuel II. who, in 1869, restricted the number of knights to 20 in addition to the sovereign, the princes, and some others. The Order of Saint Maurice and Saint Lazare was formed as the result of a union of two orders, the Order of Saint Maurice, which was founded by Count Amadeus VIII. in 1434, and the Order of Saint Lazare, which claimed to have been instituted in Jerusalem in the latter part of the 10th century. The union was renewed 27 Dec. 1816 by Victor Emmanuel, who decreed new statutes and withdrew the limit upon the number of knights. Other Italian orders are: The Military Order of Savoy, founded 14 Aug. 1815 by King Victor Emmanuel; the Civil Order of Savoy, founded 29 Oct. 1831 by King Charles Albert of Sardinia; the Order of the Crown of Italy, founded 20 Feb. 1868 by King Victor Emmanuel II., and the Order of Agricultural Merit, founded 9 May 1901 by King Victor Emmanuel III.

**JAPAN.**—Japan has several orders, all of recent origin: The Supreme Order of the Chrysanthemum, which is worn by the Mikado himself and is conferred almost exclusively upon foreign sovereigns and princes of the blood, was founded by Emperor Mutsuhito 27 Dec. 1877. The less important Japanese orders are: The Order of the Sun of Paullownia, founded 1 Jan. 1888; the Order of the Eastern Sun, founded by Emperor Mutsuhito 10 April 1875; the Military Order of the Golden Kite, founded 11 Feb. 1890; the Order of the Sacred Treasure, founded 3 Jan. 1888; the Order of the Crown, for women, also created 3 Jan. 1888, and the Medal for Life-saving, founded 7 Dec. 1881.

**KONGO INDEPENDENT STATES.**—The Kongo Independent States confers three orders and one medal for service, all of which were instituted by Leopold II., King of the Belgians. These are: The Order of the African Star, founded 30 Dec. 1888; the Order of the Royal Lion, founded 9 April 1891; the Order of the Crown, founded 15 Oct. 1897, and the Star of Service of the Kongo Independent States, created 16 Jan. 1889.

**KOREA.**—Korea possesses five orders, three of which, the Order of the Golden Rule (Keum Ch'ok), the Order of the Plum Blossom (Li Hoa), and the Order of the National Flag (Tai Keuk), were founded by Royal decree 17 April 1900. The Order of the Purple Falcon (Cha Eung), for military service, and the Order of the Eight Elements (Pai Koi), founded 16 April 1901, are the other decorations.

**LIBERIA.**—The Order of the Beneficence of Liberia of the African Redemption was founded by the Legislative Corps of the Republic 13 Jan. 1879. Other Liberian decorations are: The Gold Medal of the Lone Star, and the Order of Merit, bestowed for service in the civilization of Africa.

**LUCCA.**—The following orders formerly bestowed by the Duchy of Lucca are no longer conferred: The Order of Saint George, for military merit, founded by Duke Charles Louis 7 May 1841, and the Order of Merit of Saint Louis, created by Duke Charles Louis 22 Dec. 1836.

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**LUXEMBURG.**—The Order of the Golden Lion of the House of Nassau was founded in common by Duke Adolph of Nassau and King William III. of The Netherlands 16 March 1858. The Order of the Oaken Crown, conferred upon all classes, was founded by Grand Duke William II. 29 Dec. 1849. There is also an Order of Civil and Military Merit, founded by Duke Adolph of Nassau 8 May 1858. Its decorations include a Cross of Merit and medals for the arts and sciences.

**MADRID.**—Don Carlos of Madrid, pretender to the throne of Spain, bestows the Order of Charity upon his adherents, but the decoration is recognized by none of the authorities.

**MEXICO.**—The Mexican Orders, which are no longer conferred, are: The Order of Our Lady of Guadalupe, founded in 1852; the Order of the Mexican Eagle, founded by Emperor Maximilian 1 Jan. 1865; a Medal for Bravery, and the Order of Saint Charles, for women, founded by Emperor Maximilian 10 April 1865.

**MODENA.**—The Order of the Eagle of Este, which was founded in 1855 by Duke Francis V., is no longer conferred.

**MONACO.**—Only one order is conferred by the reigning Prince of Monaco, the Order of Saint Charles, which was founded by Prince Charles III. 15 March 1858.

**MONTENEGRO.**—The decorations conferred by the reigning Prince of Montenegro are: The Order of Independence, founded by Prince Danilo 5 May 1855, and reorganized by Prince Nicolas I.; the Order of Saint Peter, founded in 1852; the Military Medal of Oblith, for bravery, founded in 1851; a gold Medal for Bravery, founded by Peter II. in 1841, and a Medal of Devotion, for patriotic service, founded by Prince Nicolas in 1895.

**NETHERLANDS, THE.**—The Order of William, founded by King William 30 April 1815, is a reward for conspicuous military service, while the Order of the Netherlands Lion, founded by King William 29 Sept. 1815, is a recompense for civil merit. The Order of Orange-Nassau was created by Queen Regent Emma, in the name of Queen Wilhelmina 4 April 1892. The sovereign of The Netherlands also bestows the decorations of the Teutonic Order, the Commandery of Utrecht, which was abolished by Napoleon, having been re-established by King William in 1815, as well as the Order of the Golden Lion, the family Order of the House of Nassau.

**NICARAGUA.**—The Order of Saint John of Nicaragua, founded by the Government of the Republic 1 May 1857, is no longer conferred.

**PARAGUAY.**—The Order of Merit was founded in 1864 by Lopez II.

**PARMA.**—The Order of Merit of Saint Louis, founded by Charles II. 22 Dec. 1836, is no longer conferred.

**PERSIA.**—The orders conferred by the Shah of Persia are: The Order of the Sun and the Lion (Nishane Shir va Khurshid), founded by Fath Ali Shah in 1808; the Order of the Sun, for women (Nishane-Aftab), founded by Nasr-ed-Din Shah 1873, and a Medal for the arts and sciences (Nishane ilmi), founded in 1851.

**PERU.**—The Cordon of Honor, founded 15 June 1866.

**PORTUGAL.**—Portugal possesses several orders of consequence, some of them being of great antiquity. The Military Order of Saint Benedict of Aviz was founded in 1158 under the name of the "Order of Calatrava"; was extended by Alfonso Henriques 13 Aug. 1162; was transferred to Aviz in 1187, and was changed to an order of military merit, under its present title 10 June 1789. The Order of Saint James of the Sword was founded in Spain in 1175, and was introduced into Portugal by Alfonso Henriques in 1290. On 31 Oct. 1862 it was changed to an Order for the arts, science, and literature by Louis I. The Order of the Tower and Sword was created by Alphonse V. in 1459 and was reorganized as an order for bravery, loyalty, and merit 28 July 1832. The Order of Our Lady of the Conception of Villa-Viciosa was founded, as an order for both sexes, by John VI. of Portugal and Brazil 10 Sept. 1819. The Order of Saint Isabelle, for women, was founded by the Prince Regent, John, 4 Nov. 1801, and the Civil Order for agricultural and industrial merit was created by King Carlos 4 June 1893. Portugal also confers the decoration of the Order of Christ, a military order that was founded, on the ruins of the abolished Order of the Temple, 14 Aug. 1318. Its membership is restricted to Roman Catholics of noble birth.

**PONTIFICAL.**—Several orders of importance are still conferred by the Holy See. The doubtful Order of the Golden Spur, now the Order of Saint Sylvester, claims greater antiquity than any other Knightly Order on the presumption that it was instituted by Constantine the Great and confirmed by Saint Sylvester. Many

reliable authorities, however, attribute its origin to Pope Pius IV. in 1559. On 31 Oct. 1841 Pope Gregory XVI. decreed new statutes restricting its applications to zeal in the cause of the church and civil virtues and dividing it into two classes, Commanders and Knights. The Order of the Holy Sepulchre, which is attributed to Pope Alexander VI. and Godfrey of Bouillon was created with about the same motives as the Order of Saint John of Jerusalem. It was confirmed by Pope Benedict XIV. in 1746, and the decorations of its three classes are now conferred in the name of the Holy See by the Latin Patriarch at Jerusalem. The Order of Christ as conferred at Rome closely resembles the Portuguese order of the same name. In Rome, however, noble birth is not a requisite to admission. Other Pontifical orders are: The Order of Pius IX., founded by Pope Pius IX. 17 June 1847; the Order of Saint Gregory the Great, founded by Gregory XVI. 1 Sept. 1851; the Order of the Moor, an art distinction, founded by Pope Pius VII. 23 Sept. 1806; and the Order of Saint Cecilia, a musical distinction, founded 17 June 1847. The Golden Rose is sent occasionally to high dignitaries, and sometimes to cities or churches, in recognition of high type of character. It originated in the 13th century, and of late it has been bestowed chiefly upon women of royal blood.

**RUMANIA.**—The Rumanian decorations are necessarily extremely modern. The Order of the Star of Rumania (Steaua Romaniei) was created 22 May 1877 by Prince Charles, and the Order of the Crown of Rumania (Coroana Romaniei) was instituted by the same ruler 14 March 1881. Other Rumanian decorations are: A Medal of Military Virtue, instituted 29 May 1872; a Medal for Merit acquired in the arts and sciences, instituted 4 March 1876, and a Medal for faithful service, instituted 20 April 1878, all founded by Prince Charles.

**RUSSIA.**—Although the Russian orders are very modern when compared with those of other countries the bestowal of any one of them confers nobility. The Order of Saint Andrew, patron saint of Russia, is the oldest and highest decoration conferred by the Czar. It was founded 11 Dec. 1698 by Czar Peter I. Other decorations are: The Order of Saint Catherine, for women, founded 24 Nov. 1714 by Czar Peter I.; the Order of Saint Alexander-Neviski was created by Empress Catherine I. 21 May 1725; the Military Order of Saint George, created by Empress Catherine II. 7 Dec. 1769; the Order of Saint Vladimir, bestowed upon Russian subjects and foreigners in the active service of the state, founded by Empress Catherine II. 4 Oct. 1782; the Order of Saint Anne, created by Charles Frederick, Duke of Schleswig-Holstein Gottorp, in 1735, in memory of Empress Anne, and adopted as a Russian order by Emperor Paul I. 5 April 1797; and the Honorary Distinction of the Red Cross, instituted in 1809 by Emperor Nicholas II. The three Polish decorations, the Order of the White Eagle, supposed to have been founded in 1325 by Vladislav V., King of Poland; the Order of Saint Stanislas, instituted 7 May 1765 by Stanislas Augustus Poniatowski, King of Poland, and the Order of Military Merit, instituted by the same ruler in 1792, were adopted as Imperial Orders of Russia in 1831. The minor decorations of Russia are medals commemorative of the reigns of Emperor Alexander III., Emperor Nicholas I., and several important events in the history of the empire, all of which were instituted by Emperor Nicholas II.

**SAN MARINO.**—The chivalric Order of San Marino was founded by the Sovereign Grand Council of the Republic 15 March 1860.

**SERVIA.**—The Servian orders are: The Order of Saint Lazare, which is worn by the King; the Order of the White Eagle, commemorative of the re-establishment of the kingdom and conferred for personal services to king or country, founded 23 Jan. 1883 by King Milan I.; the Order of the Cross of Takovo, for services in the cause of Servian independence, founded by Prince Michel Obrenovitch III. 22 May 1865; the Order of Saint Sava, for services in behalf of the Church, of education or of literature, founded by King Milan I. 4 Feb. 1883, and the Order of Miloch the Great, founded by King Alexander I. 29 Dec. 1898. As the latter order was bestowed for distinguished services in behalf of the Obrenovitch Dynasty it is, of course, no longer conferred.

**SIAM.**—The religious Order of the Nine-Pointed Star, bestowed only upon Buddhists, was instituted 29 Dec. 1869; the Order of the Great Crown (Maha Chakri), conferred only upon sovereigns and princes and princesses, was founded 21 Sept. 1884; the Order of the White Elephant of Siam (Maha-Wahra-Bohru), the highest national order, was instituted in 1861; the Order of the Siamese Crown (Mongkut-Siam), was founded 29 Dec. 1869; the Order of Chulachonclao, otherwise known as the Sacred Order which contains a



portrait of the king, is conferred only upon natives. It was founded 16 Nov. 1873. The only minor decoration bestowed by Siam is a medal for servants and artists, in two classes, instituted 10 Sept. 1887.

**SICILY, or THE TWO SICILIES.**—The following orders of the Two Sicilies are no longer conferred: The Order of Saint Ferdinand and of Merit, founded 1 April 1800 by King Ferdinand IV.; the Order of Saint Janvier, founded by King Charles III. 6 July 1738; the Royal Order of Constantine, said to have been instituted by the Emperor Constantine and reorganized in 1191 by Emperor Isaac Ange Comnène; the Royal and Military Order of Saint George of the Reunion, founded by Joseph Bonaparte, King of Naples, 24 Feb. 1808; the Order of Francis I., created by King Francis I. 28 Sept. 1829, and the Order of the Two Sicilies founded by King Joseph Bonaparte 24 Feb. 1808.

**SPAIN.**—In addition to the Golden Fleece (see *Austria*) and the Military Order of Malta, which is the Spanish branch of the Order of Saint John of Jerusalem, Spain possesses several important and ancient decorations. The Military Order of Calatrava was founded by King Sancho III. in 1158 to commemorate the recovery of that town from the Moors, a victory won in 1147. In 1523 King Charles V. vested the grand membership of this Order, as well as that of the Orders of Alcantara (founded in 1156) and Saint James (confirmed in 1175) in the crown of Spain. They are now purely military. The Military Order of Saint Ferdinand was founded by royal decree 31 Aug. 1811, and is bestowed upon subaltern officers and soldiers for bravery. The Military Order of Our Lady of Montesa was created 22 July 1319 by James II., King of Aragon and Valencia. Other Spanish Orders are: The Military Order of Saint Hermenegilde, instituted 28 Nov. 1814 by King Ferdinand VII.; the Royal American Order of Isabella the Catholic, for the defense of the American possessions, founded by King Ferdinand VII. 24 March 1815; the Order of Isabella II., for officers below the rank of "Chef de Battalion," founded by King Ferdinand VII. 19 June 1833; the Illustrious Royal Order of Charles III., instituted by King Charles III. 19 Sept. 1771; the Order of Military Merit, founded 3 Aug. 1864; the Order of Naval Merit, founded 3 Aug. 1866; the Order of Marie-Victoria, founded by King Amadeus 7 July 1871; the Order of the Beneficencia, for humane and useful public service, was created by Queen Isabella II. 17 May 1856; the Military Order of Marie-Christine, founded in 1890, and the Order of Marie-Louise, for women only, instituted by Marie Louise, wife of Charles IV., 21 April 1792.

**SWEDEN AND NORWAY.**—Sweden has the distinction of possessing the only Masonic Order in the world, the Order of Charles XIII., which was founded by King Charles XIII. 27 May 1811, being bestowed only upon Freemasons. The Order of the Seraphim, or the Blue Ribbon, is of great antiquity, having been instituted at least as early as 1285. It was revived in 1748 by Frederick I., who specified that no one beneath the rank of lieutenant-general should be admitted to membership. The Order of the Sword, or the Yellow Ribbon, is supposed to have been founded by Gustavus Vasa, in 1522. On 28 April 1748 it was reorganized by Frederick I. The Order of the Pole Star, or the Black Ribbon, was founded by Frederick I. 28 April 1748, as a reward for civil merit. The Order of Vasa, or the Green Ribbon, was created by King Gustavus III. 26 May 1772. The only Norwegian Order is that of Saint Olaf, which may be bestowed, for special merit, upon all classes. The Order was founded by King Oscar I., 21 Aug. 1847, in commemoration of the deeds of Saint Olaf, who freed the land from Denmark in the 11th century.

**TURKEY.**—The most important Turkish Orders are: The Imperial Order of the Medjidie, for faithful service for the state, founded in August 1851 by Sultan Abdul Medjid; the Nishan-i-Shefkat, instituted in 1878 by Sultan Abdul Hamid II., in honor of the "Turkish Compassionate Fund" of 1877, and bestowed only upon women, and the Imperial Order of the Osmanie, established for distinguished civil or military services by Sultan Abdul Aziz 4 Jan. 1862. Other Turkish Orders are: The Order of Hanedani-Ali-Osman, conferred only upon members of the Imperial family, founded by Sultan Abdul Hamid II. in 1895; the Order of Merit (Nishan-i-Imtiaz), created 21 Sept. 1879, by Sultan Hamid II.; the Order of Glory (Nishan-i-Iftikhar), founded 19 Aug. 1831, by Sultan Mahmud II.; the Medal of Merit (Liakat), founded 1561, by Duke Como de' Medici; the Order of Merit of Honor (Iftikhar), founded in 1856 by Sultan Abdul Medjid.

**TUSCANY.**—The Tuscan Orders, no longer conferred, are: The Military and Ecclesiastical Order of Saint Stephen, Pope and Martyr, founded 15 March 1561, by Duke Como de' Medici; the Order of Merit

of Saint Joseph, founded in 1514; the Order of the White Cross, founded in 1814, and the Order of Military Merit, founded 19 Dec. 1853, by Grand Duke Leopold II.

**VENEZUELA.**—The Order of the Bust of the Liberator, otherwise known as the Order of Bolivar, was created by the Congress of Peru 12 Feb. 1825, and accepted by President Monagas of Venezuela, 11 March 1854. The Order of Merit was founded by President Paez, 29 Aug. 1861, and the Medal of Public Instruction was founded by Guzman Blanco.

**ZANZIBAR.**—Zanzibar's single decoration is the Order of the Jeweled Star, founded by Sultan Bargasch Ben Seid 22 Dec. 1875.

JOHN R. MEADER,

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**Or'dinal**, that portion of the Anglican Book of Common Prayer (see *PRAYER BOOK*) which contains the offices for the consecration of bishops and the ordination of priests and deacons. So far it corresponds with certain offices in the Pontifical (q.v.) of the Roman Catholic Church.

**Or'dinance of 1787**, in American history, an act of Congress passed in July 1787, to regulate the government of the western lands granted to the Ohio Company. The ordinance has been called "the most notable law ever enacted by the representatives of the American people." It marks the beginning of one of the most remarkable growths ever known in territorial expansion, and it has furnished the bases for the constitutions of several States. It is especially noted for three great provisions of all good government,—its guaranty of entire freedom of worship,—its perpetual prohibition of human slavery,—and the great prominence given to the matter of schools and education in the words "Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." Three more important principles could hardly be found in any law. The "Ordinance of 1787" is more than a mere law passed by Congress, which might be changed or repealed. It does not say "Be it enacted," but it says "Be it ordained by the United States in Congress assembled that said territory, for the purposes of temporary government, be one district, subject, however, to be divided into two districts, as future circumstances may, in the opinion of Congress, make it expedient." This declaration constitutes the first section of this great state paper, and it is followed by 13 other sections, making 14 in all, the first 12 of which provide for the management of affairs under a temporary government of the Northwest Territory. After providing for temporary government, the great purpose of this remarkable state paper is set forth in plain but unmistakable terms, when it says,

And, for extending the fundamental principles of civil and religious liberty, which form the basis whereon these republics, their laws and constitutions, are erected to fix and establish these principles as the basis of all laws, constitutions, and governments, which forever hereafter shall be formed in said territory to provide also for the establishment of states, and permanent government therein, and for their admission to a share in the federal councils on an equal footing with the original states, at as early periods as may be consistent with the general interest:—It is hereby ordained and declared by the authority aforesaid (United States), That the articles shall be considered as articles of compact between the original states and the people and states in the said territory and forever remain unalterable, unless by common consent.

The articles referred to are six in number, and form a definite compact between the United

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States as it then existed, and the people of the Northwest Territory and the States that might afterwards be formed from it.

**Ordination**, the ceremony by which bishops, priests and deacons, candidates for the minor orders and ministers of any denomination are admitted to their specific office in the church. The Roman Catholic doctrine of ordination is confirmed by John xx. 21, 22, and the power of ordination is believed to be descended from the apostles through the bishops. Ordination is reckoned one of the seven sacraments. Orders in the Roman Catholic Church are normally conferred by bishops and the higher orders can be conferred by no other functionary. Holy orders are conferred normally on the Saturdays in any of the four Ember weeks, on the fifth Saturday in Lent, on Holy Saturday; but two grades cannot be conferred the same day on the same person. A bishop is normally ordained on a Sunday or on the festival of an apostle. The English Church also considers ordination as a real consecration, the power of communicating which has descended from Christ through the apostles and bishops (see APOSTOLIC SUCCESSION). There is, however, a diversity of opinion on this point, the high-church party maintaining the dogma, the broad and some of the low church party denying it. For ordination in the English Church, subscription to the 39 articles and the declaration that the Book of Common Prayer contains nothing contrary to Scripture, are required. The ceremony of ordination is performed by the bishop with the imposition of hands on the person to be ordained. In the English Church ordination is a requisite to the exercise of a ministerial office; but in some denominations ordination is not necessary for that purpose. In the Presbyterian Church ordination means the act of settling or establishing a licensed preacher over a congregation with pastoral charge and authority, or the act of conferring on a licensed preacher the powers of a settled minister of the gospel without the charge of a particular church, but with general powers wherever he may be called upon to officiate. The Congregationalists believe that the call of a congregation gives ministerial authority to a preacher. In the Methodist Episcopal churches the form of ordination closely follows that of the Protestant Episcopal Church, with omission of every form of expression which may appear to favor sacerdotalism.

**Ordnance** (variant of ordination, form Lat. *ordinare*, to order). The word owes its application to military machines to an ordinance of Henry VIII. of England, regulating the manufacture of cannon, and establishing a board charged with the care of the crown fortifications. In time, cannon manufactured according to the specifications of the decree came to be known as ordnance or ordnance. In its present usage, the term comprehends all machines designed to hurl projectiles of any kind, shape, or size, by the agency of explosives. More particularly, it is understood to refer to mounted cannon as distinguished from those pieces such as rifles, pistols, or other small arms usually held in the hand while being fired. Prior to the 14th century, ordnance consisted of a great variety of machines for hurling large and heavy missiles which were propelled by the reaction of a tightly twisted rope of hemp, catgut, or

hair, or by the action of a lever and sling. Of the former, the most important and powerful were the ballista, catapult, scorpion, and the onager. They threw large stones and heavy arrows or darts; the catapults, especially, being credited with the power of throwing a missile a distance of half a mile. Of the sling machines, the trebuchet, mate-griffon, and the matefonda, throwing stones and small arrows, were the most effective and in general use. About the latter part of the 13th century, the arbalest, a small portable ballista, throwing shot and small arrows by the action of a bow string arrangement, came into general use. The string was pulled back to a state of tension either by the foot or a mechanical device worked by the hand. It was discharged while held against the shoulder, the propelling string being liberated by a trigger worked by the finger. The arbalest may be considered as the fore-runner of the modern musket and rifle, but the relation is wholly that of a similarity of purpose. In the ancient blow-gun, however, some analogy to the modern pneumatic gun is found, but the lesson taught is not of much importance.

Early in the 14th century the first arms and machines employing gunpowder as the propelling agency came into use, gradually replacing with gunpowder cannon all of the earlier types of ordnance. The exact date upon which they were first used is not known. Cannon called "crakys of war" were used by the English against the Scots in 1327, and by the French against the Flemish in 1338. They were made of bars arranged like the staves of a barrel, which were bound together by iron hoops and wrappings to give the necessary strength. They were very short and thick, and wide in the bore. They resembled bowls or mortars, the latter term being applied even at the present time to a particular type of ordnance. They hurled stone projectiles with slow velocity and little accuracy of aim. At first their effectiveness was not as great as that of the catapults either in accuracy or power, but later, improvements in shape and mountings and longer cylindrical bores, increased the accuracy of aim, while thicker walls with narrower powder chambers concentrated the powder gas, giving greater velocity to the projectiles. In the 15th century the use of cannon increased, great improvements being made in shape, size, and power. Bombards, culverins, and serpentines, with bores 20 to 25 inches in diameter, weighing over 18 tons, and throwing stone projectiles ranging in weight from 200 to 1,000 pounds, were sometimes used. The constructive effort, however, was not confined to the larger types. The arquebus, the first form of hand gun or small arm which may be compared fairly with the modern musket or rifle, was invented about the earlier part of the century. In the first forms the match was applied to the touch-hole by the hand, but in 1476 a contrivance suggested by the trigger of the mediæval arbalest was employed for that purpose with greater speed and certainty.

About this time the method of casting replaced that of bars and hoops in the construction of large ordnance, introducing bronze and brass as materials. Great improvements were made in mountings; trunnions were introduced, and carriages were employed to facilitate transportation with troops. The most marked ad-

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vances in these matters were made by France from 1460 to 1482. Stone projectiles were replaced by cast-iron shot with increased range and effect, but their greater density required greater propelling pressures and caused a reduction in calibre (the diameter of the bore) and a corresponding increase in the thickness of the walls of the tubes. Therefore the guns manufactured during the latter part of this century were of better workmanship, lighter weight, and greater power. The first cast guns were cast hollow, but in 1749 the French discovered a method of boring guns cast solid which gave improved shape of bore, but without any material gain in strength, as was subsequently demonstrated by the Rodman system of construction. Although the 16th century did not witness any great advance in artillery science, the manufacture of ordnance grew to greater proportions, while methods were carefully studied and practically developed to obtain the greatest efficiency. The requirement of mobility caused a return from cast-iron to the lighter brass; improvements such as handles and cascabels for operative purposes were introduced; while case-shot and shells occasionally replaced solid projectiles. Upon the assumption that the range increased indefinitely with the length of the piece, guns were made of extreme length, often equaling 50 or 60 calibres. This tendency, however, was checked by the condition that shell fuses had to be lighted before insertion, and caused many premature explosions. The opposite extreme was reached by the Dutch who designed the howitzer, a piece so reduced in length that a shell could be put into it by the hand. The greatest advances, however, were made by Gustavus Adolphus of Sweden. Recognizing the necessity for the mobility of field artillery, he introduced the "kalter" or leather guns. They were cylinders of thin beaten copper screwed into a brass breach-piece, the chamber of which was strengthened by iron hoops. These guns were of comparatively little strength and could bear but light charges; the great requirement, mobility, however, was obtained. Guns heavier than 12-pounders were excluded from field use, the most effective for that purpose being the 4-pounders weighing  $5\frac{1}{4}$  hundredweight and drawn by two horses. Loading was facilitated by the use of cartridges made of paper or canvas and gave greater rapidity of fire.

In the 18th century the manufacture of ordnance made rapid progress, especially on ballistic matters. Hollow projectiles were introduced, and "grape," consisting of a number of tarred lead balls held together in a net, was employed. About this time (1765) the influence of General Gribeauval, of the French Army, began to be felt in the construction and use of ordnance. Canister, consisting of a number of small shot held in a thin can, and dispersed by the breakage of the can upon discharge, invented by him, replaced grape with more satisfactory results. He inaugurated great reforms in artillery science and built up very complete and distinctive systems for field, siege, garrison, and coast ordnance. Realizing the full value of mobility for field ordnance, and the necessity of better operating facilities for the other types, he reduced the size of the guns, decreased the charge, and reduced the windage. Carriages were built

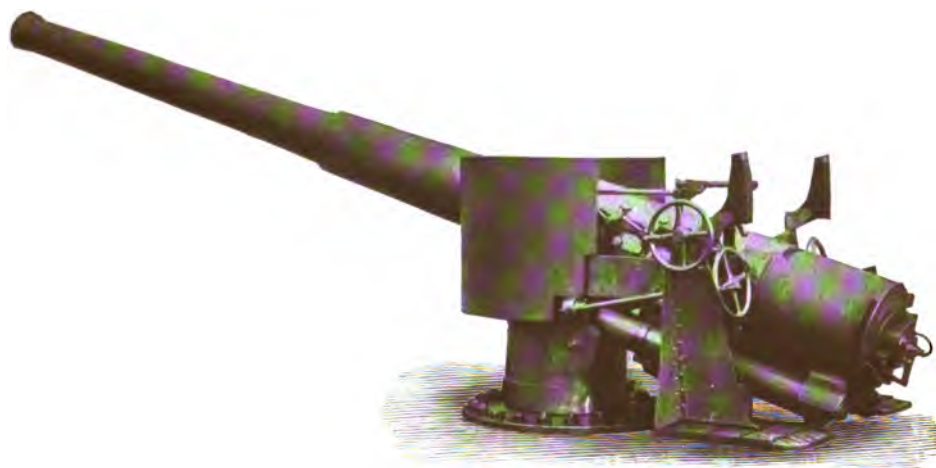
on a uniform plan of combined wood and iron, all susceptible parts being made interchangeable. Draft was diminished by the increased height of the limber wheels; iron axle-trees, replaced those of wood, while verticle pin-tails on top of the limbers, and the substitution of poles for shafts, facilitated limbering and unlimbering. Traveling trunnion poles were introduced to distribute the weight of the piece over the four wheels; the horses were harnessed in pairs instead of tandem; and the prolong-rope was employed to unite the gun trail to the limber in slow retirement. For garrison ordnance, carriages with wheels in front and rear-trucks were used, while those of coast fortifications were mounted on traversing platforms pivoted in front, and with a truck in the rear running on a circular track. The system of uniformity of construction and interchangeability of parts was applied to the guns also, while their service was greatly improved by the adoption of cross-headed elevating screws and tangent scales, together with the use of fixed ammunition in which the powder, cartridge, and projectile were united.

Near the close of this century, short cast-iron guns called "carronades" were introduced by Gascoigne, of the Carron Iron Works (Scotland). They were lighter than the ordinary guns; had powder-chambers like mortars, and were especially adapted for naval use. They were generally carried on the upper decks; were more easily handled and loaded than the longer guns, and threw heavy shots at low velocities, with great battering effect. The sailors, with whom they were great favorites, called them "smashers." They were very effective in the close engagements of their time, but are not represented by any type of modern ordnance; the present demand being for high-power guns developing high velocities for projectiles, with great powers of penetration at long ranges.

About the beginning of the 19th century these requirements forced a return to guns with longer barrels and larger powder-chambers. Of this type, the "columbiad," invented by Colonel George Bomford (U. S. Army), did effective work in the War of 1812, and up to about 1860, when they were superseded by the Rodman guns. Abroad General Paixhans of the French Army developed the idea still farther and produced the "Paixhans gun," the extensive use of which, together with the columbiads, practically compelled the adoption of armor for ships. From the middle of this century, the construction of ordnance received a higher order of scientific thought and investigation. The requirements of high velocities and flat trajectories, without lightening the weight of the projectiles, formed the basis for all designs.

In 1856 Admiral Dahlgren (U. S. Navy), designed the "Dahlgren guns" with shapes proportioned to the "curve of pressures," heavy at the breech and light at the muzzle. They represented a distinct advance in power with the minimum of weight, and were especially adapted for naval use. On the other hand, higher velocities required the development of greater pressures, which soon grew to such proportions that they exceeded the power of resistance represented by the tensile strength of cast iron. Another inherent weakness of castings was due

ORDNANCE.



Breech Mechanism for 6 in. R. F. Gun.

Six inch R. F. Gun, with Cradle Mounting.



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to the fact that they cooled from the outside inwardly, thus placing the inside metal in a state of tension and the outside in a state of compression. To obviate this condition Gen. Rodman, Chief of Ordnance, U. S. Army, suggested the casting of guns hollow and cooling them from the inside outwardly, by circulating a stream of cold water in the bore while the outside surface was kept at a high temperature. This method placed the metal inside in a state of compression and that on the outside in a state of tension—the proper condition to successfully withstand the pressure of the powder gas, which tends to expand the inner portions beyond the normal diameter and throw the strain on the supporting outer layers.

This system was universally employed and gave the best results obtainable from cast iron for many years, and was only superseded by that of "built up" guns, when iron and steel were made available by improved processes of production. The first built-up guns were made by Chambers and Treadwell (Americans), and Blakely of England. They made guns consisting of wrought-iron tubes with strengthening hoops shrunk on under initial tension; but Sir William Armstrong of England was the first to successfully produce guns, in which the principle of initial tension extended to all parts of the piece. Recognizing that wrought-iron bars were twice as strong in the direction of the fibre than across, he made hoops by winding rectangular bars around a mandrel into helical coils which were subsequently welded together. These hoops were expanded by heat and shrunk on over the inner tube and over each other, so that the inner tube and hoops were placed in a state of compression and the outer hoops under initial tension. It is clear that the most effective gun of this character would consist of a large number of very thin hoops shrunk on over each with such initial tensions that all of them would be equally strained by the discharge. An approximation to this condition was first made by Longridge of England, who produced a gun consisting of a steel tube wound around with steel wire under tension. The method was farther developed by Woodbridge in 1872, who recommended a thin steel tube wrapped with wire which was subsequently brazed together with melted bronze; and by Crozier in 1889, who employed a forged steel tube compressed beyond its natural elastic limit before being wound with square tinned steel wire under tension. The wire-wound system, although possessing a great deal of ingenuity, fails to give longitudinal strength. Perhaps the best representative of the system is the Brown segmental tubular wire-wound gun. It was of 5-inch calibre, and consisted of a thin steel tube of high elastic limit which formed the interior of the breech and extended a little beyond the base of the projectile, while the main tube, consisting of longitudinal steel bars, extended the full length of the piece, and was entirely wound with wire at such a tension that even under maximum pressure the tube was in a state of compression. While this condition was necessary to prevent the separation of the joints it possessed the undesirable feature of using a tube under an initial compression beyond a natural elastic limit. Although wire-wound guns of considerable size

were made, some weighing as much as 23 tons and throwing a projectile of 600 pounds with fair velocity, the inherent weakness of the guns to withstand longitudinal strains will, in all probability, prevent much farther development of the system. The application of rifling to heavy ordnance, and the adoption of steel as the best material to withstand the enormous pressures developed in rifled guns, followed each other closely and firmly established the "built up" system as the best for the construction of heavy ordnance. It was not carried to its highest development, however, until the large stocks of smooth-bores owned by the various nations had been temporarily utilized in the form of converted rifles. In 1860 Parsons, of the United States, suggested the method of converting smooth-bores into rifles by inserting a rifled steel tube through the breech, the rear end of which was finally closed by a permanent screw plug. The forward movement of the tube was prevented by shoulders at several points. In 1863 Sir W. Palliser, of England, brought forward the method of inserting a coiled wrought-iron tube through the muzzle end, the forward movement of which was prevented by a collar fastened to the muzzle of the gun, and the tube subsequently rifled. The Palliser system, although not as effective as that of Parsons, was cheaper and was adopted in England and America, where, between 1874 and 1880, many 10-inch smooth-bores were thus converted into 8-inch rifles that compared favorably with rifles of original construction produced by other European powers at that time. The underlying principle of the Palliser method was subsequently applied to the original construction of guns, and together with that of the "built-up" system comprises the method employed in the manufacture of modern heavy ordnance, while the Parrott rifles and the Whitworth guns serve as connecting links between the application of rifling to and the adoption of steel as a material.

The Civil War in the United States created a demand for a quickly made rifle. The West Point Foundry (Parrott's) at Cold Springs, N. Y., supplied this demand with a gun consisting of a hollow cast-iron rifled tube, strengthened by a coiled wrought-iron hoop shrunk on the breech under initial tension. They were 100, 200, and 300 pounders, and rendered effective service, but the unreliable cast-iron component stood in the way of any farther application of the system.

From 1873 to 1890 attempts to construct large guns of steel, cast in one piece, were comparatively unsuccessful; while the method of expanding hoops by heat produced grave weaknesses in the guns constructed by the built up system. To eliminate these shortcomings, Sir J. Whitworth perfected a system of fluid-compression to improve steel ingots, and constructed guns by forcing steel hoops over a central tube and over each other by hydraulic pressure. Since 1890, however, the manufacture of steel ingots has progressed to such an extent, that first-class steel forgings weighing over 25 tons are now more readily produced than were those weighing three tons, 15 or 20 years ago. Improved methods of tempering and annealing have also removed weaknesses due to the expansion of hoops by heat for constructive purposes, so



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that steel is now exclusively used in the manufacture of ordnance.

**Classification.**—The various forms of modern ordnance are classified and named according to size and weight; kind of projectiles used and their velocities; angle of elevation at which they are fired; use; and mode of operation.

**Guns.**—Now designated as "breech-loading rifles" (B. L. R.), to distinguish them from the obsolete smooth-bores and muzzle-loading rifles still in existence, are from 3 inches to 13 inches in calibre, from 12 to 39 feet in length, and from 1 to 70 tons in weight. They fire solid shot, or shells, weighing from 13 to 1,100 pounds, at high velocities (2,800 to 2,300 feet per second) and low elevation (about 12° max.). Their projectiles are capable of penetrating the best steel armor, from 2.3 to 19.4 inches in thickness, at the distance of 2,000 yards. The terms, field, siege, and sea-coast guns, indicate no essential differences in the guns themselves, but prescribe limits of weight according to the required mobility. For field use about the most effective size is that of the 3.2-inch breech-loading steel rifle; for siege purposes, that of the 5-inch siege mortars and guns; while the largest and heaviest types of ordnance are employed on the sea-coast fortifications.

**Howitzers** are shorter than guns of equal calibre, are fired at low velocities and higher angles, the maximum elevation being about 20°.

**Mortars** are still shorter, are fired at still lower velocities and higher elevations, ranging from 45° to 60°. They are used to throw shells over intervening obstructions against objects and into camps unreachable by gun fire at low elevations.

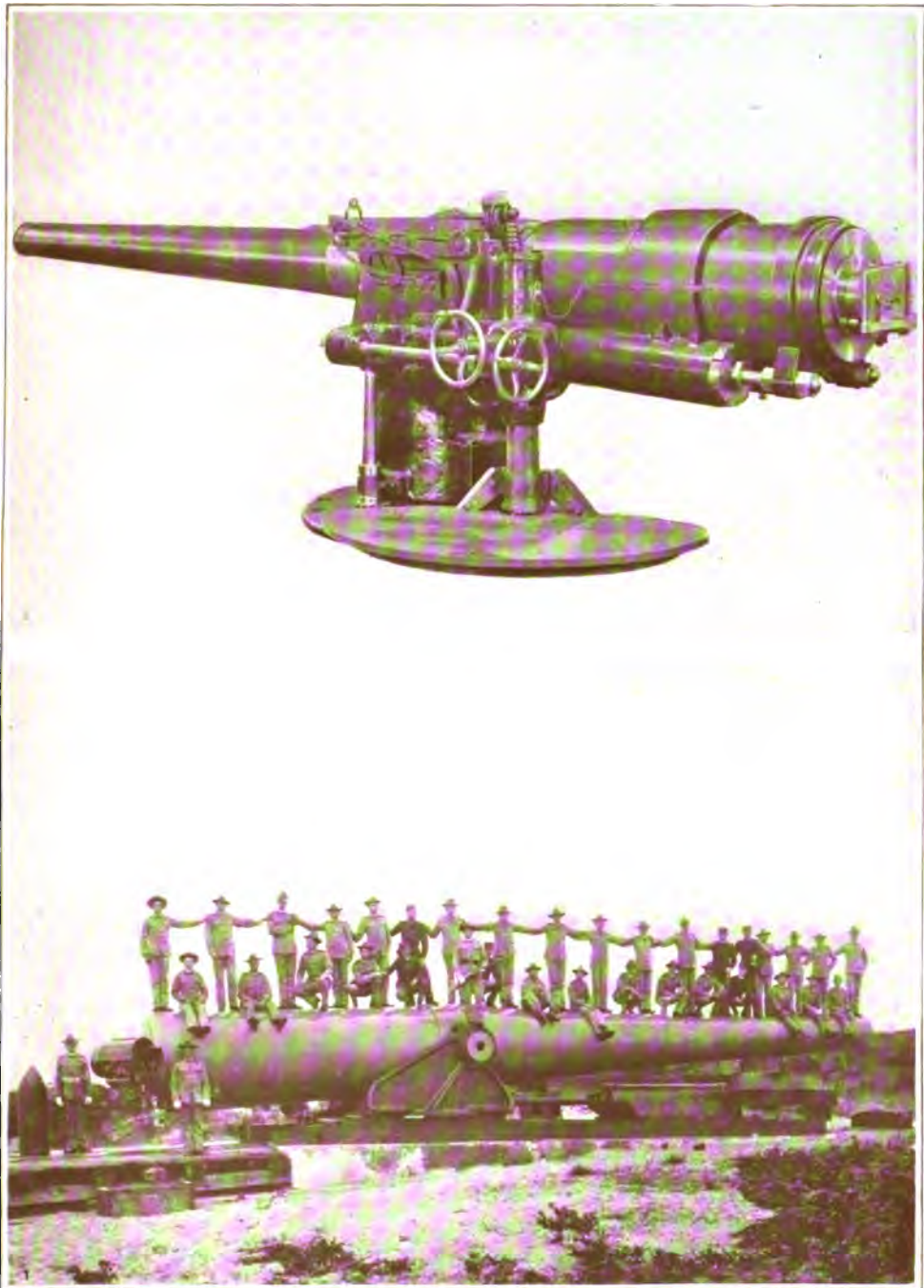
**Rapid-fire guns** are those in which the operation of opening and closing the breech is performed by a single motion of a lever actuated by the hand. They are charged with fixed ammunition, the projectile, explosive, and primer being contained in a single metallic case, so that loading also is done by one motion, and differentiates them from that class of ordnance in which the projectile, explosive, and primer are inserted separately. Up to within a short time the term "rapid-fire," in the United States, and "quick-fire," in England, implied similar qualifications, but now, in the United States Navy, a rapid-fire gun is officially defined as one in which a quick-working breech mechanism is operated by a single motion of a lever; in which fixed or separate ammunition may be used, but if the latter, prescribes a metallic case to hold the explosive; while a quick-fire gun is defined as one in which a quick-working breech mechanism is operated by one motion of a lever; is fitted with an automatic lock, and in loading uses a powder charge put up in a cartridge bag. These guns are made in various forms and are operated by several different systems of breech mechanism generally named after their respective inventors. Those best known are the Vickers-Maxim and the Armstrong, mostly used in England; the Canet, used in France and Russia; the Krupp in Germany; the Skoda and Krupp in Austria; the Bofors in the naval service of Norway and Sweden and of Denmark; while in the United States the Dashiell, Fletcher, Hotchkiss, Driggs-Schroeder, Maxim-Nordenfeldt, and Vickers-Maxim are used exclusively. The Nordenfeldt, one of the

first designed, is not much used by any country. Rapid-fire guns vary in size from 1-pounders to 13.5-inch rifles, and in speed of fire from 60 rounds per minute, in the Vickers-Maxim 1-pounder, to 1 round in 2 minutes, in the 13.5-inch B. L. R. The speed of the smaller guns depends upon the drill of the crew, while that of the larger guns depends practically upon the mechanism of the mount. The accompanying table gives the best speed of fire of modern guns of various calibres:

Calibre	Number of rounds
1.4-in. 1 pounder, automatic	200 per minute.
1.8 " 3 " " "	60 " "
2.24 " 6 " " "	20 " "
3 " breech-loading rifle	17 " "
4 " " " "	15 " "
5 " " " "	12 " "
5.5 " " " "	9 " "
6 " " " "	9 " "
8 " " " "	6 " "
8.3 " " " "	3 " "
9.2 " " " "	2-3 " "
10 " " " "	1 " "
11 " " " "	1 " "
12 " " " "	1 in 1 min. 30 secs.
13 " " " "	1 in 2 minutes.
13.5 " " " "	1 in 2 minutes.

The development of rapid-fire guns practically dates from 1881, at which time the British Admiralty called for a gun not to exceed 1,120 pounds in weight, and capable of propelling a 6-pound projectile with a muzzle velocity of 1,800 feet per second, to use fixed ammunition, and to be served by not more than three men. About the same time the French authorities called for a three-pounder to fulfil similar conditions. Hotchkiss, an American, living in France at that time, responded by producing a series of one-, three-, and six-pounders, while Nordenfeldt brought out similar guns in England. These guns were intended for use against torpedo boats, and the calibres chosen were considered sufficiently large for that purpose, as the torpedo boats at that date were weak and slow, but the advent of swifter and stronger torpedo boats and destroyers, with their coal arrangement practically amounting to a protective armor, caused an increase in calibre, and quick-working breech mechanisms were soon applied to guns of all sizes up to and including the six-inch breech-loading rifles. At this point fixed ammunition became unwieldy, necessitating the separation of the projectile from the powder charge. This condition, however, has not reduced the speed of the larger guns, as the ammunition thus separated is easier handled. In the effort to satisfy the requirement of increased speed of fire a new type of the Vickers-Maxim was introduced in 1897, in which a quick-working breech mechanism automatically ejects the primer and draws up the loading tray into position as the breech is opened. This system was quickly applied to the new guns of the United States Navy and materially increased the speed of fire in all calibres. That of the five-inch guns was especially improved and to them the system will probably be applied universally, while it is safe to state that the general improvement in the breech mechanisms of all guns during the last five years has more than doubled their speed of fire. A comparative

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1. New Brown 6-inch Wire Gun. Velocity 3290 feet per second.
2. 16-inch Breech Loading Rifle—the largest in the world.



description of the Fletcher and Vickers-Maxim systems will be sufficient to give a general idea of these mechanisms. In the Fletcher, which is a development of the Farcot system, a worm-wheel on a vertical spindle works on a rack attached to the breech plug. To operate, the slotted-screw breech plug is first rotated by a crank to disengage the threads, then moved rearward and turned clear out of the breech. It is probably the simplest and strongest of all breech mechanisms. In the Vickers-Maxim a short arm driven from the vertical axis of the operating lever shifts its centre during the motion. In the six-pounders and smaller guns the Hotchkiss breech-block, consisting of a vertically sliding wedge, and the Driggs-Schroeder mechanism, in which the block is dropped to clear it from the housings of the breech and then revolved to the rear around a horizontal axis, are practically the only systems used.

*Machine Guns* are rapid-fire guns in which the speed of fire is such that it is practically continuous. Attempts to construct multiple-firing guns may be traced back to the earlier part of the 17th century. Small guns of Chinese manufacture have been found bearing dates as early as 1607. They are necessarily of crude construction and consist of two parallel barrels re-inforced at the breech ends with three hoops each of which has a vent, showing that the piece is arranged to fire three shots successively out of each barrel. From the middle of the 17th century to the middle of the 19th century, frequent efforts were made to produce rapid-firing guns, but with indifferent success. The introduction of fixed ammunition about 1860, however, contributed greatly toward their successful construction. During the Civil War in the United States, a great many forms of magazine and repeating rifles, pistols, and machine guns of a more or less effective character, were quickly produced, of which the "Gatling gun" was by far the best. It was invented by Dr. R. J. Gatling of Indianapolis in 1860 and assured for machine guns a permanent place in armaments. Machine guns may be more precisely defined as those in which the operations of loading, firing, and extracting the empty cartridge shells, are wholly or in part accomplished by mechanism. They are of three classes: (1) those operated by hand-power, electric-motor, or any other form of exterior force; (2) the semi-automatic, in which, although the energy of recoil is partially used to actuate the breech mechanism, each round of ammunition is inserted by the hand and the trigger is pressed for each discharge; (3) the automatic, in which the energy of recoil, or a part of the powder gas pressure at each discharge is fully utilized to operate the piece, which fires the rounds continuously while the trigger is pressed. To the first belong the Gatling and Gardner guns, the Nordenfeldt and the Hotchkiss revolving cannon.

The Gatling gun consists of a number (usually 10) of parallel barrels grouped around and secured firmly to a main central shaft, to which is also attached the grooved cartridge carrier and the lock cylinder. Each barrel is provided with its own lock or firing mechanism, independent of the others, but all of them revolve simultaneously with the barrels, carrier, and the inner breech, when the gun is in operation.

The rotation of the gun gives a reciprocating motion to the locks, the forward and backward movement being effected by a cam actuated by the turning of the operating crank. In firing, one end of the feed case containing the cartridges is placed in the hopper on top and the operating crank turned. The cartridges drop one by one into the grooves of the carrier, and are loaded and fired by the forward motion of the locks, which also closes the breech, while the backward motion extracts and expels the empty shells. When first invented it was entirely different in principle and action from all other multiple-fire guns, admitting of faster discharges and heavier projectiles. It has passed through some stages of alteration and improvement, mainly in the arrangements for feeding the ammunition. At different elevations the original tin feed cases worked irregularly, so that the cartridges did not always fall into their proper positions in the grooves of the carrier, and jamming was of frequent occurrence. Various devices were designed to obviate this defect. The Bruce feed case, constructed on the gravity principle, overcame the defect of jamming, but not the irregularity of action at different angles of elevation, and was superseded by the Accles feed drum. This was a positive feeder, which rotating with the revolving barrels and lock cylinder, fed the cartridges with perfect regularity at any angle of elevation. It had, however, two serious drawbacks—its weight and the large amount of exposed surface, which if struck by a single bullet would at once put it out of action. In the latest method of feeding employed, the cartridges are attached to long strips of flexible metal and are fed into the openings in the hopper. As the gun is revolved by the operating crank, the projections in the grooves of the carrier act upon the cartridges and force the strips through the hopper, each cartridge being deposited in its proper position in the grooves of the carrier block and the empty strips thrown out to the right. In the latest forms an automatic traversing arrangement for scattering the bullets is attached, which can be thrown in or out of gear as may be desired, regulating the amplitude of the arc through which the breech is moved so as to spread the bullets over the required front. In its present state of efficiency the Gatling gun fires at the rate of 1,200 shots per minute, a speed of fire, by separate discharges, not as yet equaled by any other gun.

*The Nordenfeldt*, a contemporary of the Gatling, proved very efficient as a ship's gun. In it the barrels (usually 10) are placed horizontally side by side, and are immovable. Each barrel has its own firing mechanism, but all the locks, bolts, strikers, and spiral springs are contained in one box which is moved backward and forward by the operating lever. When the box is moved backward the cartridges fall out of the hopper on top and are deposited simultaneously in the grooves of the carrier. The forward motion of the box pushes them into the barrels, the cocking catches compress the spiral springs which are subsequently released by the lever in quick succession and produce a continuous fire. In this gun careful aiming from a moving platform is possible, so that at the right instant all the barrels may be fired at the object almost simultaneously, therefore its use-

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fulness as a naval weapon. Its speed of fire is about 600 shots per minute.

The *Gardner Gun* closely resembles the *Nordenfeldt*. It consists of two or more barrels fixed immovably side by side in the same horizontal plane. The loading, firing, and extracting mechanism is moved backward and forward by a crank turned by the hand. Shortly after the appearance of the *Gatling* in the United States the "mitrailleuse" was produced in Belgium, and subsequently adopted by France. It consisted of several barrels (usually 25 or 37) arranged around a central shaft and covered with a metal casing. The barrels were loaded through the breech by the use of a metal disk pierced by holes to correspond with the number of barrels, a cartridge being held in each hole or chamber. In firing, this disk was placed against the breech end of the barrels, then the box containing the strikers was placed against it and all of the cartridges discharged at once. It was used to some extent in the Franco-German war of 1870, but was never very successful, and has been completely superseded by the *Gatling* and other types. The speed of fire of the Belgian gun was about 440 shots per minute, but that of the French piece rarely exceeded 300. The *Gatling*, *Nordenfeldt*, and *Gardner* guns, as also the various forms of mitrailleuse, were generally made in rifle calibre (.45-inch), but *Gatlings* of .65-inch, and *Nordenfeldts* of 1-inch calibre, were constructed about the time the *Hotchkiss* one-pounders were produced, in response to the call of the English and the French authorities in 1887, for rapid-firing machine guns to be used against torpedo boats. The larger *Gatlings* and *Nordenfeldts* fire respectively about 200 and 100 shots per minute with sufficient velocity to penetrate the light iron plates generally used in the construction of torpedo boats. The five barrels of the *Hotchkiss* fire a total of 25 rounds per minute, but as its size has been increased up to the 6-pounders, which are capable of firing explosive shells or canister, its speed of fire has been relatively increased together with additional powers of penetration.

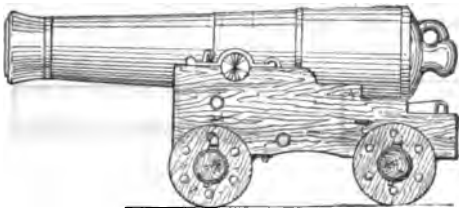
*Semi-automatic Guns* belonging to class 2 are represented by those of the *Armstrong*, *Driggs*, and *Maxim-Nordenfeldt* patterns, the last-named being the best known and the most effective. It has been adopted by the United States Navy to the exclusion of all other guns of the semi-automatic type, and is in fact the only gun of this character employed in the naval service of any country. Semi-automatic mechanisms are applied to guns too heavy to be operated by that of the ordinary machine gun. In them the recoil of the barrel is utilized as the actuating energy. The backward movement compresses the spring, which in turn pushes it forward again and forces the breech downward while the extractor throws out the empty cartridge case. In this position of the barrel the breech block is held open until a fresh cartridge is inserted which slides the extractors into the bore and allows the breech block to rise and close the breech, the gun being again ready to be fired. These mechanisms are most effectively used in guns of 2.24-inch and 3-inch calibre, giving them a speed of fire from 20 to 17 shots per minute, respectively.

*Automatic Guns* belonging to class 3 are the *Hotchkiss*, *Colt*, *Yamanouchi* (Japanese), and

the *Maxim*. They are made in rifle calibres and are operated by the pressure of the powder gas upon a level or piston when the piece is discharged. The larger types are the *Maxim-Nordenfeldt* one-pounder, called "pom-pom" in the British-Boer war of 1899-1902; the *Skoda* automatic gun, and the *Dawson-Silverman* three-pounder. In these, excepting the last named, the recoil of the barrel or breech-block operates the mechanism. A description of the construction and operation of the *Colt* automatic gun will serve to give a general idea of those in which the pressure of the powder gas is used to actuate the mechanism. Near the muzzle the barrel is perforated radially by a small hole which is covered by a cylindrical lug attached to the front end of a vibrating lever pivoted on the gun. When the piece is discharged and the bullet passes the hole, the pressure of the powder gas in the barrel throws back the lug of the lever with enough force to reload and fire. The walls of the barrel are more than half of an inch in thickness, and it contains enough metal to prevent overheating without the use of a water jacket. The cartridges are attached to a bandolier or belt of woven cotton (250 to a belt), which is fed into the machine from a box at the side. The speed of fire is from 250 to 300 rounds per minute, so that when firing continuously a fresh belt of cartridges has to be placed in position every minute, but the consequent loss of time amounts to only a few seconds. For naval use those of .236- and .303-inch calibres, weighing about 42 pounds, are the most effective, generally being mounted on the ship's rail or on the rails of the fighting tops. A description of the *Maxim .303-inch* calibre automatic gun will be sufficient to explain the construction and operation of the type in which the recoil of the barrel is the actuating energy of the breech mechanism. It consists of a movable barrel and recoiling lock frame carrying a crank with a projecting arm and fusee to which a chain is attached. The fore end of a spiral spring is fixed to the non-recoiling breech casing, its rear end being connected with the recoiling crank and fusee. When the piece is fired the barrel and lock move backward together about an inch, then the barrel is pushed forward again by springs and separated from the lock, leaving a space between them. This space is filled first by the extracted cartridge case and then by a fresh cartridge which is forced into the barrel and fired by the subsequent forward motion of the lock, actuated by the stored-up energy of the fusee spring. It is provided with a water jacket and fires from 300 to 350 rounds per minute. In the field machine guns are used to deliver a destructive fire along a wide front; or a concentrated fire into massed troops. In the former case the traversing gear is employed, while in the latter the barrels are fired in a stationary position. The relative efficiency of the rifle calibres and the larger automatic guns may be more clearly understood by comparing a .303-inch gun, which fires about 350 bullets per minute and has a maximum range of 2,500 yards, with a 15-pounder, which fires six rounds of shrapnel shells per minute, and has a range of 6,000 yards. As each shrapnel shell contains 212 bullets the number of bullets delivered at the target amounts to 1,272 per minute. As naval

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weapons, machine guns of small calibre are the most efficient. Mounted on light draft vessels they are very useful in close-range operations on rivers and on the waters of narrow harbors, while as boat guns they render efficient service to drive off the enemy preparatory to the landing of troops, or to cover their re-embarkation. The efficiency of the larger calibres, however, is more questionable. The effect of the bursting of a one-pounder shell against the unarmored side of a cruiser, much less against the heavy armor of a battleship, is absolutely nothing; while against modern torpedo boats even the six-pounders are quite ineffective. Probably the best weapons for use against torpedo boats are rapid fire guns of about 3 to 4-inch calibre, throwing shrapnel shells, and capable of being carefully aimed. The impression that the projectiles discharged from a machine gun of any type can be directed like the jet from a hydraulic hose is absurd. The jump and jerk of recoil of the guns of even the smallest calibre is so powerful that good aim is out of the question at any range. On this account the larger machine



32-Pounder Carronade (1800).

guns are so constructed that they can fire single shots whenever desired—a capability which probably defines their most efficient use.

The organization of machine gun details and the method of their employment as attachments to regiments of cavalry and infantry, differ in the various countries. The lessons taught by their use in the Franco-German war, or in the operations of the British in their Egyptian and Indian campaigns, are quite inconsequential. The British-Boer war afforded an opportunity for the use of every form of modern machine guns, but under conditions unfavorable for a determination of their use in the future. That the noise of the "pom-poms" exerted a demoralizing effect greater than that of bursting shrapnel shells is undoubtedly a fact, and, although the "moral effect of gun-fire" is one of the important problems of military science, it is hardly worth more than an incidental mention in this connection. One fact, however, is clear, on account of their great mobility they will be advantageously employed in the future as auxiliaries to the regular field batteries, which they never can be expected to supersede.

The manufacture of ordnance requires the solution of a great many scientific and practical problems involving the adaptations of means to ends, and the exactitude of the adaptations increases with the increase in the size of the guns and their required greater efficiency.

So complex a subject is more conveniently treated by grouping the various operations into

a number of general classes, as follows: Requirements for Efficiency; Principles of Design; Materials and Methods of Construction; Rifling; Systems of Loading; and Carriage and Mounts.

*Requirements for Efficiency* are, safety, accuracy of fire, destructive effect of projectile, and speed of fire. To these may be added that of mobility, especially applicable to field ordnance.

*Principles of Design.*—In designing a gun as an engineering structure, two distinct sets of conditions have to be considered—those regulating its proportions, influenced by the character of its intended use—and those pertaining to its mechanical construction, to withstand the strains it may be subjected to under the requirements for efficiency.

The three principal strains that a gun has to withstand are, (1) a circumferential tension caused by the outward pressure of the powder gas, acting radially with a tendency to enlarge the bore and split the gun open longitudinally; (2) a longitudinal strain having a tendency to stretch the gun or pull it apart in the direction of its length; and (3) a transverse strain caused by the weight of the parts of the gun overhanging beyond the point of support; all of which are brought into action the instant the gun is fired. The calibre of the gun having been determined, together with the conditions of loading—the weight of the projectile and the powder charge necessary to give it the required velocity; the pressure that will be exerted on the surface of the bore is determined by calculating its amount at a certain number of given points and a "pressure curve" plotted. Such a curve shows that the maximum pressure is exerted before the projectile has moved more than a few inches, and decreases rapidly as it approaches the muzzle. With the pressure as a known factor in the problem, the material having a tensile strength sufficient to sustain the forces that will be exerted is selected, and methods of construction determined, to dispose it economically and safely, consistent with the production of the desired ballistic results.

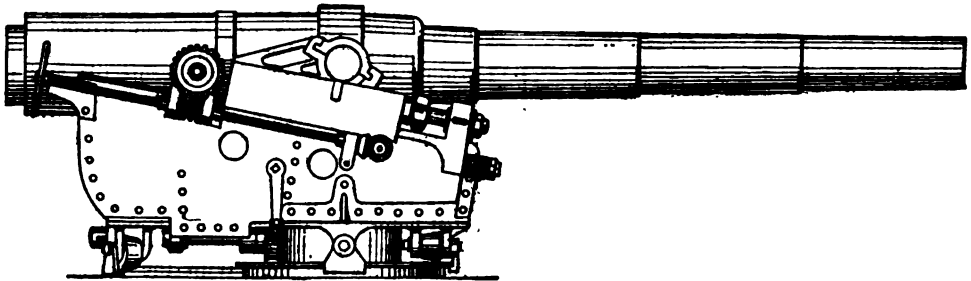
*Materials and Methods of Construction.*—In the development of ordnance increasing pressures compelled the employment of materials of greater and greater tensile strength and higher elastic limits. Wooden bars held together with iron hoops gave way to cast-iron, which in turn was superseded by bronze, brass, wrought-iron, and steel, until finally the pressures exceeded the inherent strengths of the materials and forced the adoption of methods of construction by which additional powers of resistance were derived from the *arrangement* of the material. In hollow cast-metal guns there is a limit beyond which increase in thickness does not give additional strength to resist bursting pressure. If the metal employed was incompressible, the resistance to the pressure by each concentric layer of the metal would be inversely proportional to the square of its distance from the axis of the bore. But as all metals possess not only the quality of compressibility, but that of extensibility as well, the interior layers are supported by those on the outside to a very great degree. Therefore the great object in construction is to so arrange the material that the exterior layers will take up as much as possible



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of the pressure exerted upon the interior layers. Dahlgren first suggested the construction of guns in which the disposition of the materials was in accordance with the data obtained from the curve of pressures, while Rodman introduced the principle of initial tension. In the construction of modern built-up guns these principles are carried into effect as follows: An ingot of "low steel" is cast and allowed to cool slowly to avoid strains. It is then bored in a lathe, reheated, and forged on a mandrel. Consequent strains are removed by annealing, and the forged tube is turned and bored in a lathe to about the required size. After being oil-tempered, to give toughness, and re-annealed to remove strains induced by the tempering, it is re-bored in a lathe and smoothed by a reamer. In the meantime different parts of the outside of the tube are turned to sizes slightly exceeding the calculated shrinkages of the hoops intended to encircle them. This difference is about three thousandths of the corresponding diameters, the shrinkages being so calculated that under no circumstances will any portion of the metal be strained beyond its elastic limit. Jackets and hoops are constructed in a similar manner and the various parts assembled into a complete gun. In the operation of assembling the tube is placed

allows the projectile to rebound along the sides of the bore as it is driven forward, the direction of its departure from the muzzle being that of the last bound, instead of that of the axis of the bore; while the lack of exact sphericity in the shape of the projectile causes an unequal pressure of the air on the different parts of its surface, still farther deflecting it from the aimed direction. Accuracy of manufacture can reduce these errors, but cannot remove them entirely. Therefore by rifling the bore the projectile is caused to rotate around its own axis, which is coincident with that of the bore. Thus, the errors due to windage are completely eliminated and the effects of unequal air pressure are neutralized. Rifling is effected by furrowing the surface of the bore with a series of spiral grooves of uniform or increasing twist. The number of grooves and the amount of twist depends upon the calibre and length of the gun, the required muzzle velocity of the projectile, the length of the projectile, and the velocity of rotation necessary to keep it point-first while being driven through the air. The earlier muzzle-loading guns were rifled with grooves of a uniform twist, and the projectile was provided with ribs or studs which fitted into the grooves and caused it to rotate while being



6-inch Gun (1883).

in a vertical position in a pit; the hoop or jacket to be put on is subjected to a temperature of about 700° F., and its diameter expanded to a size about .06 inch greater than that of the part it is intended to surround. In this condition it is lowered over the tube until it rests upon the shoulder which fixes its position. It is then cooled. The water is first poured on and around it near the shoulder (to prevent the jacket drawing away from the shoulder when it cools), then progressively upward, over the entire hoop. The gun is then put on the lathe and its surface turned preparatory to the shrinking on of the next hoop, the operation being repeated until all the hoops are in place, including the trunnion hoop, onto which the trunnions are forged solid. The gun is then finish-bored to the required calibre, turned to the specified form and rifled.

**Rifling.**—When a spherical projectile is fired from a smooth-bore gun, the probability of its following the direction corresponding to the aim is very small. The tendency of such a projectile to follow the mean trajectory (path of flight) depends upon the amount of "windage" (the difference between the diameter of the bore and that of the projectile), and the exact sphericity of the projectile. Large windage is the principal cause of error, since it

driven forward. As the size of the guns increased the greater strain of imparting rotation at starting tended to force out the studs and wear away the driving edges of the grooves. The casting-on of ribs was found to be impracticable on account of difficulties of manufacture, and all attempts to use expanding projectiles were unsuccessful. Therefore the system of increasing-twist, based upon the principle of the semi-cubical parabola, was devised and practically met all the requirements of the case. Studded projectiles were replaced by those with copper bands fitted around the base. These bands being slightly larger than the bore were forced into the rifling grooves and not only gave rotation to the projectile as it was driven toward the muzzle, but by cutting off all the windage acted as an effectual gas-check. The various systems of rifling, designated "single-groove," "double-groove," or "poly-groove," according to the number of grooves employed, are here stated in the chronological order of their development and adoption, but the last-named is the one now used, exclusively.

For example—the guns of the United States Navy are rifled under a poly-groove system in which the twist increases from 0 to 1 turn in 25 calibres. The grooves start parallel to the axis of the bore, but quickly incline to the form

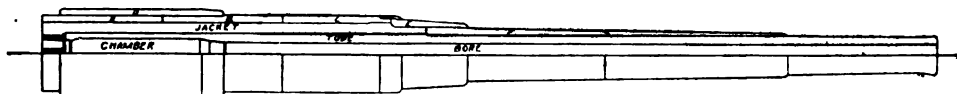
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of a parabolic spiral, the twist increasing to a point near the muzzle, from which point the curve is uniform. Upon discharge the strain of rotating is thrown forward toward the muzzle, the point of least pressure; the projectile enters the bore without a rending shock; it is rotated with increasing velocity as it moves forward, and leaves the muzzle, rotating at the rate of one revolution in a distance equal to 25 times its own diameter. In general the number of grooves is determined by multiplying the calibre, expressed in inches, by four. A 10-inch gun would have 40 grooves. In depth, they are about .05 inch, and several times as wide, being comparatively broad and shallow at the start, but gradually decrease in width toward the muzzle.

*Systems of Loading.*—Attempts to employ breech-loading systems may be traced farther back than even the earlier part of the 16th century, but until about 1880 they were attended by a comparative loss of safety and power in the larger guns. The theoretical superiority of the breech-loading system over that of muzzle-loading was unquestionable, but the conditions involved in closing the rear end of the bore (the seat of greatest pressure) temporarily, presented a problem very difficult of practical solution. As early as 1858 Armstrong introduced breech-loading guns into the English Navy, but, although his rifled breech-loaders, constructed in the early 70's, proved very powerful as com-

portant of those employing a transversely sliding breech-block, a wedge of D section slides in a slot cut through both sides of the breech and across the bore. To load, the wedge is pulled out to the left, the charge is inserted through the rear of the breech, the wedge is pushed back into position and pressed hard against the end of the bore by a screw with powerful handles. For a gas check the "Broadwell ring" is used. This device is a ring of L section which fits into a recess formed by enlarging the rear end of the bore. The pressure of the gas expands the ring, one flange of which is pressed against the walls of the powder-chamber and the other against the face of the wedge, thus completely sealing the joint and effectually cutting off the escape of gas to the rear.

In the French system, better known as the "interrupted or slotted screw system," the breech is closed by a longitudinal screw-plug working from the rear and swung on a vertical hinge permitting it to be revolved horizontally to the side when it is withdrawn. The screw on the plug and the engaging screw on the breech are each divided circumferentially into six sectors, in three of which the screw threads are cut away, leaving the sectors alternately threaded and plain. To close the breech, the screw-plug is revolved around the vertical axis of the hinge to a position opposite the hole in the breech; the threaded sectors of the plug are made to coincide with the plain ones of the engaging



Section of Built-up Gun.

pared to the old muzzle-loading smooth-bores, they also showed many serious defects of construction, and the English reverted to muzzle-loading. The experience of the other European powers was somewhat similar, but they continued experimenting on breech-loading lines, Krupp, in Germany, making especial advances. Since 1880, however, due to the great progress in mechanical construction, and in the production of suitable material, breech-loading systems have been universally applied to all classes of ordnance. The three principal and best-known types are those developed by Armstrong, in England; by Krupp, in Germany; and the Reffye system, the basic idea of which was originated by Chambers, in the United States in 1849, and subsequently developed by France about 1870.

In the Armstrong system a breech-block with a vent in it works vertically in a slot cut through the top of the breech into the tube of the gun, and is pressed firmly against the lip of the bore by a longitudinal breech-screw operated by a pair of powerful handles. The contact surfaces are of copper and they are renewed from time to time when worn out by the erosive effect of the escaping powder gas. It represented a great advance in gun construction, but was not a practical success. The inability to make the contact surfaces gas-tight, and the unwieldy weight of the sliding breech-block, even in guns of moderate size, constituted its chief faults. In the Krupp system, which is the most im-

portant of those employing a transversely sliding breech-block, a wedge of D section slides in a slot cut through both sides of the breech and across the bore. To load, the wedge is pulled out to the left, the charge is inserted through the rear of the breech, the wedge is pushed back into position and pressed hard against the end of the bore by a screw with powerful handles. For a gas check the "Broadwell ring" is used. This device is a ring of L section which fits into a recess formed by enlarging the rear end of the bore. The pressure of the gas expands the ring, one flange of which is pressed against the walls of the powder-chamber and the other against the face of the wedge, thus completely sealing the joint and effectually cutting off the escape of gas to the rear.

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screw in the breech and the plug pushed straight in, its threaded sectors being made to engage with those in the breech by one sixth of a turn of the translating crank. This system employs the De Bange gas-check, consisting of a plastic pad of asbestos flour and suet, held in a ring-shaped canvas bag between two flat metallic rings. The stem of a mushroom-shaped spindle or obturator passes through the holes in the pad and rings to the rear end of the screw-plug. Through the axis of this stem the vent is driven. When the breech is closed, the mushroom head enters the tube and the pad and rings are held in position against the face of the screw-plug. Upon discharge the spindle is forced back by the pressure of the gas, while the pad, squeezed and forced out radially, presses itself and the outer lips of the metallic rings tightly against the surface of the bore, thus preventing the escape of gas to the rear. This device, although very effectual, had a tendency to stick or jam in the bore. This is obviated by the use of split rings which constitutes one of the most important improvements of the modified form of this system, exclusively used by the United States.

*Gun Carriages and Mounts.*—Gun carriages are divided into two general classes—stationary and mobile. Their mode of action is signified by the designations, barbette, casemate or turret, motor carriage, and disappearing carriage; to any or all of which the additional qualifications—recoil or non-recoil—may be applied.

Stationary carriages are used with sea-coast

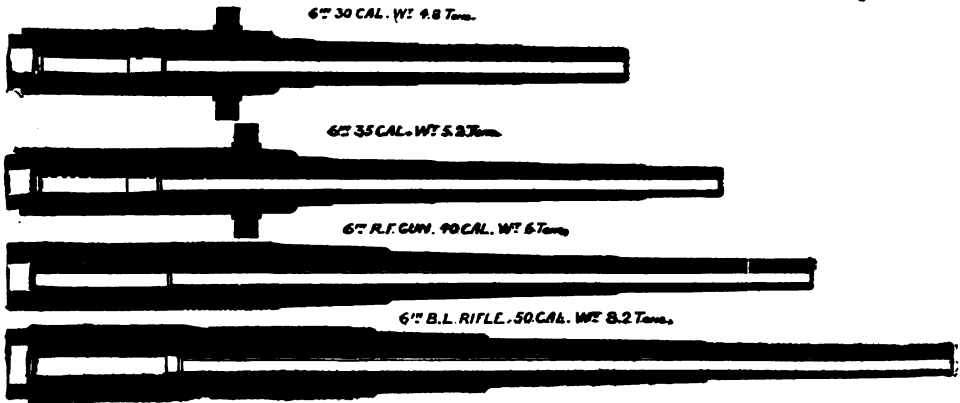
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ordnance. The modern type consists of a cast-iron base ring solidly imbedded in concrete, upon which is mounted a circular racer or turn-table, carrying the chassis. A top carriage of some form, on which the gun is directly mounted, moves back and forth upon the chassis, its motion in recoil being controlled by a hydraulic brake. This brake consists of a cylinder with a piston working in oil, the former attached to the top carriage and the latter fastened to the chassis. When the gun is fired and the recoil of the top carriage moves the cylinder backward, the oil passes from one part of the cylinder to the other through holes in the piston head. The size of these holes is regulated by taper-rods, rotating-disks, or throttling-bars, so that the varying pressure of the recoil is transformed into a constant pressure in the brake. The gun is returned to firing position by the power of springs, compressed air, or by gravity. Elevations for range are obtained by revolving the gun around the axis of the trunnions (at or near the centre of gravity of the piece) by a screw or a rack and pinion device at the breech, while traversing is accomplished by rotating the turn-table.

of a lever which drops the counter weight by releasing the pawls. Thus, all the loading, elevating, and traversing operations are performed while entirely protected from the enemy's fire, under directions received from a distance by telephone, or from the man on the sighting platform, who is the only one of the gun crew exposed to fire. The basic principle of this carriage was suggested by Gen. Buffington, Chief of Ordnance, U. S. Army, in 1872, but the credit of its development to the present state of efficiency belongs to one of his successors, Gen. William Crozier.

In the *Elswick* carriage, the lower ends of the lever arms are held by fixed pivots, and their rotation is controlled from their centres by a rod to the end of which the piston of a hydro-pneumatic cylinder is attached. The force of recoil is thus resolved into the energy of compressed air, which returns the piece to firing position.

*Mortar Carriages* originally consisted of simple iron boxes provided with trunnion beds, but now they are composed of a turn-table and chassis, the mortar being mounted on the end of a lever pivoted at its lower end to the turn-table. A hydraulic buffer placed under the lever receives the downward recoil consequent to the



*Carriages for Disappearing Guns* are best represented by the "Crozier-Buffington," used in the United States, and the "Elswick," used in England. In the former, the trunnions rest in the upper ends of a pair of lever arms, to the lower ends of which a counterweight is attached. The axle connecting the centres of the lever arms rests upon a top carriage, the motion of which is controlled by a hydraulic brake. In firing position, the lever arms are almost vertical, the top carriage and brake cylinder well forward, the gun lifted up and its muzzle thrust over the parapet. The breech of the gun is held at the proper height by a frame, the sides of which are pivoted at the top to the breech, and at the bottom to a movable slide which is raised or lowered for changes of elevation by an adjusting rod. When the gun is fired, the force of the recoil moves the top carriage to the rear, causing the lever arms to rotate backward and assume a horizontal position. By these motions, the gun is first moved to the rear almost horizontally until its muzzle is clear of the parapet, then sharply downward into the position for loading, and held in that position by pawls which catch on the counter weight cross-head. Return to firing position is accomplished by the action

high elevation at which the piece is fired, while an arrangement of spring columns returns it to the firing position. Mortar carriages for field or siege purposes are generally of the stationary type, transported from place to place in wagons.

*Mobile Gun Carriages* are of two types—those used for field, and those used for siege purposes. They are similar in principle but differ in size and detail. Both types have two wheels with an axle-tree, in front, and a trail to give a third point of support on the ground, behind. Up to 1860, they were all made of wood, with iron axle-trees and metal bracings. The trunnion beds were formed in the front ends of the flasks (sides) of the trail, and the recoil of the gun was checked by the resistance of the ground and by a friction brake as the carriage moved backward. Wood, however, was gradually superseded by iron, and since 1880, all gun carriages have been made altogether of iron or steel. To increase rapidity of fire, and to enable the carriages to bear guns of greater power without too much recoil, brakes have been devised which are set by the recoil, and released by the forward movement of the gun. In the Ehrhardt carriage, adopted by England, the gun is carried on a slide attached to a hydraulic brake, or to a

cylinder surrounded by a helical spring, which allows it to recoil about 45 inches and then returns it to the firing position, quickly and without shock. The carriage is unmoved by the discharge, its backward movement being checked by a spade with a sure hold in the ground, and it is so stable, that the operators are able to sit on the trail and perform the various duties of sighting, etc., while the piece is being fired. Similar forms of carriages are manufactured by the Bethlehem Steel Company, the Vickers-Maxim Company, and several others, all of which are of a very efficient character. In the carriages adopted by the United States, the best points of the Ehrhardt are combined with improvements suggested by Captain Wheeler, of the Ordnance Department. In it the gun recoils through a bronze cradle to a distance of 46 inches. Two cylinders containing oil check the backward movement, while helical springs return the piece to firing position.

*Siege Gun Carriages* for field use are generally attached to platforms which help to control the recoil. In the stationary form they are much heavier than the field carriages, and are built high enough to allow the gun to be fired over a six-foot parapet. The greater weight (about 6,000 lbs., as against the limit of 4,000 lbs., prescribed for the field carriage), is required by the greater energy of the recoil.

*Gun Mounts*, including those used for all forms of rapid fire guns as well as those employed with the larger types of ordnance, will be found described under the title NAVAL GUNS.

*Large Guns.*—A fair consideration of the subject of ordnance would hardly be complete without a brief mention of the maximum size and power of the guns constructed from time to time, since the introduction of gunpowder cannon up to the present date, or a reference to some constructions embodying certain novel features which at one time promised types of ordnance of great destructive power. The largest gun constructed in the 15th century appears to be the "Mahomet II," by the Turks. It required 200 men and 30 pairs of oxen to move it, and threw a projectile weighing 600 pounds. Larger pieces, capable of throwing projectiles weighing over 1,000 pounds, are still in existence in the batteries along the shores of the Dardanelles, but the time of their manufacture is somewhat uncertain. The largest gun made in the 17th century, was the cast-iron gun named the "Malick é Meidan" (Lord of the Plain). It was constructed at Bejapoor, India, by Arunzebe, or by the Mahrattas. It was 14 feet in length, 28 inches bore, and fired a projectile weighing 1,600 pounds. In 1880, the English made guns weighing from 100 to 110 tons, of about 18 inches bore, which fired a projectile weighing 2,000 pounds, with a velocity of 1,640 feet per second. About the same time, the United States produced a gun weighing 127 tons, of 16 inches bore, which fired a projectile weighing 2,400 pounds, with a velocity of 2,300 feet per second. It was the most powerful gun ever built, and will probably be the last of the great guns, as the opinion of the present time, molded by the experience of the late wars, is adverse to the construction of guns above the 12-inch calibre, and even this limit will probably be reduced by the experience of the future.

As a matter of fact, the most effective "all round" gun at the present time, appears to be the

8-inch breech-loading rifle, firing a projectile weighing 250 pounds, with a velocity of 2,334 feet per second, and capable of discharging six aimed shots per minute. Of guns embodying novel features, that invented by Capt. Zalinski, of the United States Army, appears to be the pioneer of large pneumatic ordnance. In the larger form, it consisted of a smooth-bore tube about 50 feet long, and of 15 inches calibre. By the propelling agency of compressed air, used in the gun at a pressure of 1,000 pounds to the square inch, it was capable of throwing a projectile containing 100 pounds of high explosives, such as dynamite or nitro-glycerine, to a distance of about 5,000 yards. It was designed for coast-defense purposes, but has also been used at sea. The U. S. cruiser *Vesuvius*, equipped with three tubes, was employed at Santiago during the Spanish-American war, but did not attain the success anticipated. The Sims-Dudley, another form of pneumatic gun also used about that time, appears to have been a little more successful. It throws a much smaller projectile, containing about four pounds of high explosives, by air compressed by explosions of gunpowder in an auxiliary barrel located under the main tube. The Gathmann gun, another type of ordnance designed to throw projectiles containing large quantities of high explosives, appears as yet to be in the experimental stage of construction, while as a matter of fact, the development of pneumatic guns in general, up to the point of a permanent place in armaments, is extremely problematical.

*Bibliography.*—For more specific information on ordnance matters, the following named publications are recommended: 'Journal of the United States Artillery' (Fortress Monroe, Va.); Holley, 'Ordnance and Armor'; Ingersoll, 'Text-book of Ordnance and Gunnery'; Annual Reports of the Chief of Ordnance (U. S. Army and Navy); Bruff, 'Ordnance and Gunnery'; Greener, 'Modern Breech-loaders and Choke-bore Guns'; Text-books on ordnance, ammunition, and gun carriages, published by the English War Office; 'Revue d'Artillerie' (Paris, monthly); 'Mittheilungen über Gegenstände des Artillerie und Genie-Wesens' (Vienna, monthly); 'Revue de l'Armée belge' (Brussels, monthly).

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**Ordnance, Department of**, in the United States War Department. See ARMY OF THE UNITED STATES.

**Ordovician**, ôr-dô-vish'-an, in geology, a term introduced in 1879 by Lapworth for what Murchison had called the Lower Silurian as early as 1835; the term Silurian being used thereafter for the most part only of the Upper Silurian in Murchison's nomenclature. Hence the Ordovician System may be defined as the rocks of the era after the Cambrian and before the Silurian, the latter term being used in the sense explained above. The name Ordovician is derived from a Welsh tribe. The system in America subdivides into the Trenton and Canadian periods; the former contains the Hudson, Utica and Trenton epochs, with the last of which the great Cincinnati anticline is to be connected; and the Canadian Period being represented by the Chazy limestones and the Calcareous epoch (or Beekmantown sub-group). In Great Britain the Ordovician includes the

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following epochs: Arenig; Llandeilo flags; Bala, or Caradoc Sandstone; and Lower Llandovery. Shaly and sandy strata occur in the upper and lower parts of the Ordovician, and occasionally, as in the central part of North America, the same extremes are calcareous; but these are slight exceptions to the rule, which is that the system is predominantly limestone. For the distribution of the Ordovician rocks see the articles CANADIAN SERIES; CHAZY STAGE; CINCINNATI ANTICLINE; TRENTON STAGE; UTICA STAGE; etc.

**Ordway, John Morse**, American educator and chemist: b. Amesbury, Mass., 23 April 1823; d. 3 July 1909. He was graduated from Dartmouth College in 1844 and engaged in chemical work. In 1847 he was superintendent of the Roxbury Color and Chemical Company's works at Roxbury, and in 1850 accepted a professorship in Grand River College, Trenton, Mo. After 1854 he re-engaged in chemical work; in 1869 was appointed professor of industrial chemistry and metallurgy at the Massachusetts Institute of Technology, and in 1884 became a professor at Tulane University and its branch for women, Newcomb College.

**Ore.** An ore may be defined as any mineral or aggregation of minerals from which a metal or metals can be extracted at a profit. This definition is not exact, but is one often used by geologists and mining engineers. Since the prospect of profitable extraction is involved it follows that a mineral containing a certain per cent of a metal may be considered an ore in one region and not an ore in another. Thus pyrotite containing two per cent copper would be called copper ore if situated where it could be worked to advantage, and would not be called a copper ore if situated, say, in Tibet. Again certain minerals formerly not considered as ores are not now, and other minerals not ores now will be considered such in the future. Bauxite is an ore of aluminum, but aluminum was not known a century ago. Similarly clay will be an ore of aluminum with the progress of metallurgy. Ores containing a relatively small proportion of the metal sought are termed lean or low grade, those containing a high per cent rich or high grade; the relative percentages depend on the value of the metal. Ore containing one per cent of gold would be extremely rich. In the Lake Superior country iron ores containing less than 50 per cent iron are low grade. Metals may be disseminated through a rock in the native state or as chemical compounds of sulphur, oxygen, carbonic acid, etc. Gold and silver, the noble metals, occur native as does copper. An ore carrying native gold is called free-milling. In general it may be said that nine tenths of the commercially important ores are sulphides, oxides, hydroxides, carbonates and native metals. For information on methods of extracting metals from their ores see METALLURGY, also COPPER; GOLD; IRON, etc. For a discussion of methods of occurrence of ores see below under ORE DEPOSITS.

SAMUEL SANFORD,

*(Engineering and Mining Journal.)*

**Ore Deposits.** It is impossible to draw a fixed boundary between those occurrences of metalliferous minerals that are to be regarded as ore deposits and those that are not. Generally speaking an ore deposit is any occurrence

of metalliferous minerals, large enough and rich enough to be worked at a profit. It thus appears that a body of mineral might be properly regarded as an ore deposit under some conditions and not under others. Magnetite which in places is an important ore of iron is often found scattered through granite, yet no one would regard a granite ledge as an iron ore deposit. The exact point at which rocks containing iron oxides become iron ore bodies is determined by the factor of cost of extraction. A ledge containing a small percentage of iron favorably situated might be profitably worked, if situated in some remote locality it could not.

Two views of the origin of metalliferous deposits are held. Accepting the nebular hypothesis of the origin of the solar system, we may believe that (1) when the earth cooled so far that water could rest on its surface, this hot primeval ocean held in solution or suspension all the metals. These were subsequently deposited as various minerals in the sedimentary rocks, and in the ages since these rocks have been partly or completely fused, and worked over many times, so that in brief, all deposits of ore near enough to the earth's surface to be reached by man, contain metallic atoms that were once in solution in the ocean. Or we may believe (2) that as the earth cooled from a vapor to a semi-gaseous solid and finally to its present state, the atoms of the heavier metals, or those of least chemical activity, were the first to collect, to form the nucleus of the earth, and hence that the metalliferous deposits worked to-day and the metals in suspension in the ocean were derived originally from molten rocks or rock magmas that came from the unknown depths of the earth. A strong reason for this belief is that the specific gravity of the earth as a whole is considerably greater than what is indicated by the average rocks which compose its crust. The results of recent investigations of rare metals of high specific gravity point in the same direction. Metals once thinly disseminated through a rock may become concentrated into deposits we call ore bodies in a great variety of ways. In a molten magma slowly cooling at great depths as the minerals crystallize out they may collect in aggregates, either from unequal cooling of the magma or from what we may call mineral attraction. It is fairly certain that bodies of chrome iron ore, of nickel-copper sulphides, of magnetite and possibly platinum have formed by cooling from fusion. Again supposing the minerals distributed thinly through a cooled magma—an igneous rock—they may be concentrated into workable ore bodies, (1) by the decay of the rock when, after overlying strata have been uplifted and eroded, its constituent minerals are broken up and removed by air and water and only the more resistant are left. Thus are formed the so-called *placer* deposits, whence has come much of the world's supply of gold, also the principal tin deposits. The minerals removed in suspension or solution in surface water and the contained metals may be precipitated chemically, or by some form of organic life. Thus have beds containing various iron compounds been formed, the bog iron ores, and those silicates which after a long history of pressure, heat, and partial solution are now represented by the Lake Superior iron ore deposits. Again the still-buried igneous rock

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at its contact with other rocks may cause all manner of chemical reactions. In regions where the earth's crust is deeply disturbed and the rocks bent, twisted and fractured by mountain building forces, there also may igneous rocks well up from regions of partial or complete fusion, and through the rock fractures hot waters or vapors charged with metals can penetrate. By far the greater number of mineral deposits have probably been formed by the reaction between such heated waters and the adjacent rocks.

**Classification.**—Many attempts at classifying ore deposits were based on form and mode of occurrence. Lately geologists have realized that the form of a deposit was from a scientific standpoint less important than its origin. Schemes of classification have been devised which take into consideration both form and mode of origin, but the latest classifications are based wholly on origin. The following scheme is that proposed for metallic ore deposits by C. R. Van Hise.

1. Sedimentary
  - (a) Chemical precipitates
  - (b) Mechanical concentrates
2. Igneous
  - (a) Magmatic secretions
3. Metamorphic
  - (a) Deposited from gaseous solution
  - (b) Deposited from aqueous solution

- (1) Residual deposits
- (2) Stream deposits
- (3) Beach deposits

- (1) Ascending waters
- (2) Descending waters
- (3) Ascending and descending waters

See GEOLOGY. SAMUEL SANFORD,  
(*Engineering and Mining Journal*.)

**O'reads**, in Greek mythology, a name given to various nymphs of the mountains.

**Örebro**, *ë'rë-broo*, Sweden, (1) a town, capital of the län of same name, on the Svart-Elf, near the western extremity of the Hjelm Lake, 101 miles west of Stockholm. Its buildings are almost entirely modern, being built after a great fire of 1854. One of these is a handsome Gothic town-hall. The only ancient buildings are the castle, on an island in the river, now used for public offices; and the church, which contains some interesting monuments. The manufactures comprise machinery, chemicals, matches, etc., and there is a good trade. Örebro was the first Swedish town in which the Reformation was formally established (1529). Pop. (1900) 22,013. (2) The län consists generally of undulating plains, watered by numerous streams, and containing many lakes. The only hilly district is in the north, where there are several forests, and valuable iron and other mines. The pastures rear fine cattle. The only exports of consequence are iron and timber, transmitted to Stockholm or Gottenburg.

**Oregon**, one of the United States, on the Pacific coast, bounded north by the Columbia River, which separates it for the most part from the State of Washington; east by the State of Idaho; south by Nevada and California; and west by the North Pacific Ocean. The State lies between lat. 42° and 46° 18' N., and between lon. 116° 33' and 124° 25' W. Its extreme length from east to west is 395 miles, and from north to south 278 miles. Its area is 94,560

square miles or 60,518,400 acres of land surface, and 1,470 square miles of water surface. It ranks seventh in size among the States, and was admitted to the Union 14 Feb. 1859. There are 32 counties in the State. The population in 1910 was 672,765. The capital is Salem.

**Topography.**—Primarily Oregon is a mountainous State, three great ranges dividing it from north to south; the Coast Range from 10 to 30 miles from the ocean; the Cascade Mountains, from 110 to 150 miles inland; and the Blue Mountains in the eastern part. The Coast Range has an extreme altitude of 4,000 feet, and is covered with dense forests. The Cascade Mountains, a continuation of the Sierra Nevadas, have an extreme height of 7,000 feet, with several peaks rising 2,000 to 5,000 feet higher. Mount Hood reaches an altitude of 11,500 feet, McLoughlin, 11,000 feet; and Jefferson, 10,500 feet. The Cascades are heavily timbered to the snow line. Four transverse ranges connect the Coast Range with the Cascades: the Callapooia, Umpqua, Rogue River and Siskiyou Mountains. The Willamette River Valley, lying between the Coast Range and Cascade Mountains, and the Columbia River and California spur, is 150 miles long, from 30 to 70 miles wide, and is extremely fertile. Eastern Oregon, embracing two thirds of the State, is a high table-land, with little rain fall, and sparsely populated. There are fertile valleys along the rivers and lakes in the southern portion, and in the Blue Mountains. The coast-line, which has an extent of 300 miles, is generally rugged and precipitous. There are, however, several small bays or harbors, such as Tillamook, Winchester, and Coos, all of which are land-locked, with narrow entrances. Toward the south the coast runs to an angle ending in Cape Blanco.

**Geology.**—The State has a varied geological structure. The Coast Range and Blue Mountains are of Eozoic formation; the Cascade ranges and the eastern part of the State, of volcanic, with its ridges and hills of obsidian; and the Pacific Coast, Willamette Valley, and part of the Umpqua Valley are of Tertiary formation. The Cretaceous fossil deposits are found in the upper valleys of Des Chutes, Crooked and John Day rivers, and the Grande Ronde Valley. The Glacial, Champlain, and Terrace periods are well represented. The metalliferous fields which have made California so famous are traced into Oregon. Gold is found in various places and successfully worked. Silver, copper, iron, nickel, cinnabar, and coal are also worked. There is a general lava and volcanic formation in the mountains of the State. In the cañon of the Snake River the rocks are ancient metamorphic granites, gneisses and mica-slate. In the southwest there is a belt of slate and serpentine. Generally throughout the State the soil is of volcanic origin, with alluvial deposits in the valleys, and is extremely fertile. In the central and southeastern portions of the State, the rainfall is very light, and the farming depends largely upon irrigation.

**Rivers and Lakes.**—The largest river is the Columbia, which forms three parts of the northern boundary of the State, and flows nearly due west for over 300 miles, and is navigable to its mouth in the Pacific. Its great tributary, the Snake River, flowing north, and serving as a boundary of a great portion of the State east-



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ward, and its affluents, the Umatilla, John Day, and Des Chutes rivers, on the east side of the Cascade Range, and the Willamette on the west side, all flowing into the Columbia. The Columbia has a drainage area of 245,000 square miles. The head of navigation for sea-going ships is at Portland, about 100 miles inland. From here to the Cascades navigation is open excepting for a short time in the winter when the river is frozen over. Above The Dalles the Columbia is navigable for 190 miles and the Snake River for 180 miles. The Columbia is noted for its beautiful scenery and the great number of salmon taken from its waters. Other well known rivers in the State are the Rogue, Coquille, Umpqua, Siuslaw, Alsea, Yaquina, Nestuca, Nehalem, Lewis and Clarke, Clatskanie, Youngs, Sandy, Hood, Owybee, Malheur, Burnt, Powder, and Grande Ronde. The principal lakes are, Klamath, Goose, Warner, Salt, Christmas, Albert, Summer, Silver, Henry and Malheur. Crater Lake in the Cascades, 8,000 feet above sea-level, is the crater of an extinct volcano, 10 miles in circumference, and surrounded by bluffs 2,000 feet high. It is the deepest body of fresh water in America. Goose Lake lies partly in California.

*Climate.*—A warm oceanic current from Japan flowing southward along the Pacific coast gives western Oregon a very mild winter climate. In the summer the northwest winds are cool. On the coast the mean temperature for January is 42.2°, and for July 62.3°, while great extremes are rare. In the eastern part of the State the mean temperature is 29.6° for January and 66.9° for July. In winter the extremes fall below zero, and sometimes nearly 30° below. In the west the rainfall averages 89.6 inches, in the Willamette Valley, 50.8 inches, in the east, 12.7 inches, and in the south-central portion only 6.5 inches. The wet season is from October to March. Thunderstorms are rare.

*Zoology.*—Since Oregon has been populated and developed the grizzly bear, black bear, cinnamon bear, gray wolf, coyote, panther, catamount, wildcat, polecat, deer, antelope, elk, and mountain sheep, all formerly very numerous, have retreated to the mountains or gradually disappeared. There are still to be found in more or less abundance such animals as silver foxes, martens, rabbits, squirrels, raccoons, porcupines, beaver, otter, muskrats and seals, while in the lakes and rivers are salmon, herring, trout, halibut, smelt and other fish. There are also oysters, shrimps, crabs and clams. The birds include the eagle, hawk, pelican, cormorant, gull, crane, albatross, vulture, buzzard, raven, crow, jay, robin, swallow, sparrow, rice-bird, humming-bird, swan, goose, duck and pigeon. Reptiles and insects of the more common varieties are numerous.

*Minerals.*—Oregon abounds in mineral wealth, but gold is the only product extensively mined. It is found mostly in the northeast, in the Blue Mountain region. Silver, lignite, coal, zinc, cinnabar, mercury, platinum, iridium, lead, antimony, iron, copper, magnetite and nickel are also found here. In 1908 the principal mineral productions included gold, 41,848 fine ounces; silver, 43,315 fine ounces; and coal, 77,017 short tons; and, in 1909, gold valued at \$712,000, silver \$37,000, coal \$235,085. The building stones are granite, valued at \$5,300; sandstone, \$5,450;

and limestone, \$10,900. The production of mineral waters was 50,000 gallons, valued at \$12,000, and the clay products had a value of \$327,000.

*Fisheries.*—The canning of fish ranks second among the industries of the State, with products valued at \$1,788,809 in 1900, as compared with \$1,643,324 in 1890. This industry, which is almost entirely the canning of salmon caught in waters of the Columbia River and its tributaries, has its centre in the city of Astoria, and is carried on almost exclusively by the Chinese. The industry dates back to 1866, and reached its maximum production in 1883. It is carried on also on the north side of the Columbia River, in the State of Washington, the value of the product of this latter State in 1890 being nearly a third of that of Oregon. The Columbia River has long been famous for its salmon, the product for the year 1895 "exceeding in value that of any other river in the United States or the world." The exhaustion of these fisheries has been averted by more rigid laws against improvident fishing, and by the artificial propagation of fish. The value of the fish taken in Oregon in 1908 amounted to over \$1,350,000, and 4,772 persons were employed in the industry. Since 1898 several refrigerating and freezing plants have been erected, and these, together with the use of refrigerator cars, have made possible the shipment of hundreds of tons of fresh fish annually from Portland to the east and to European cities—a fact which has tended to check the increase in the canned product during recent years.

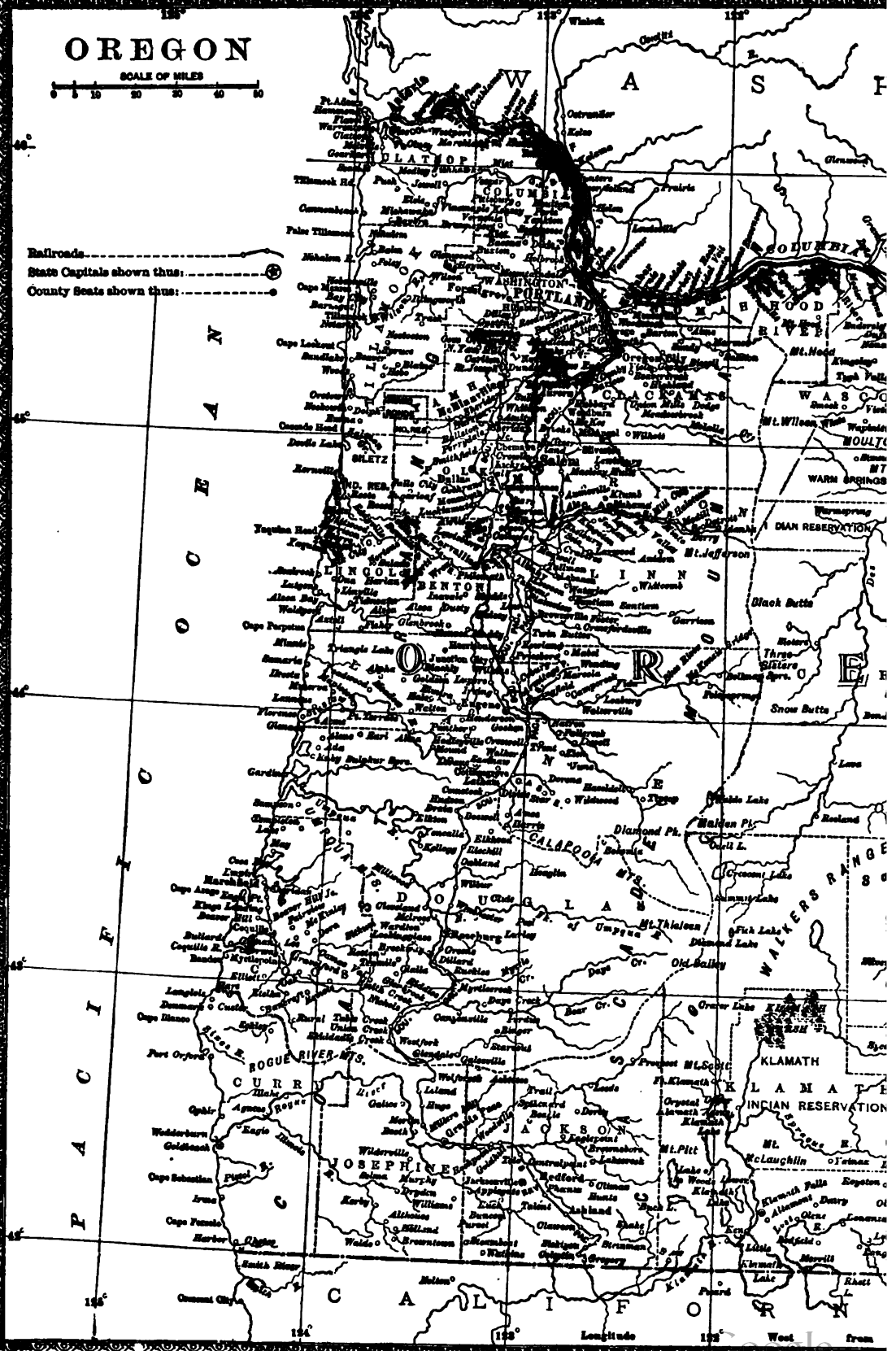
*Timber and Forest Products.*—The mountains and highlands are heavily covered with evergreens, yellow, sugar, and scrub pine, yellow and white fir, red and white cedar, several varieties of spruce, yew, juniper, tamarack, maple, alder, ash and oak. In the eastern part there are dwarf pine and juniper. In the valleys are cottonwood, willow, birch, aspen, poplar, dogwood and wild cherry. The Oregon myrtle is a common tree. Out of a total area of 96,030 square miles, 28,843 square miles, or about 30 per cent, are covered with timber of merchantable size and quality; 40,228 square miles, or 43 per cent, are wooded. The crest of the Cascade Range is a natural dividing line between two very different portions of Oregon. West of this the rainfall is heavy, and consequently the forests are, as a whole, dense and in parts extremely luxuriant. East of that boundary the rainfall is light, and the forests are comparatively scanty and open, and the stand of timber is small. The total area of that part of the State west of the crest of the range, is 28,877 square miles, of which 15,089 square miles, or 52 per cent, are occupied by merchantable timber, and 24 per cent is open country. In contrast to this, the eastern part of the State comprises 65,683 square miles, of which 13,754 square miles, or only 21 per cent, are timbered, and 68 per cent is open country. The most startling feature shown by the land classification of this State is the extent of the burned areas, especially in the coast ranges and in the northern half of the Cascades. These burned areas comprise altogether not less than 7 per cent of the area of the State. Out of a total area, at one time timbered, not less than 18 per cent has been destroyed by fire. The present stand of timber in the western portion of the State being approximately 154,713 million feet, and the burned area being about one third of the

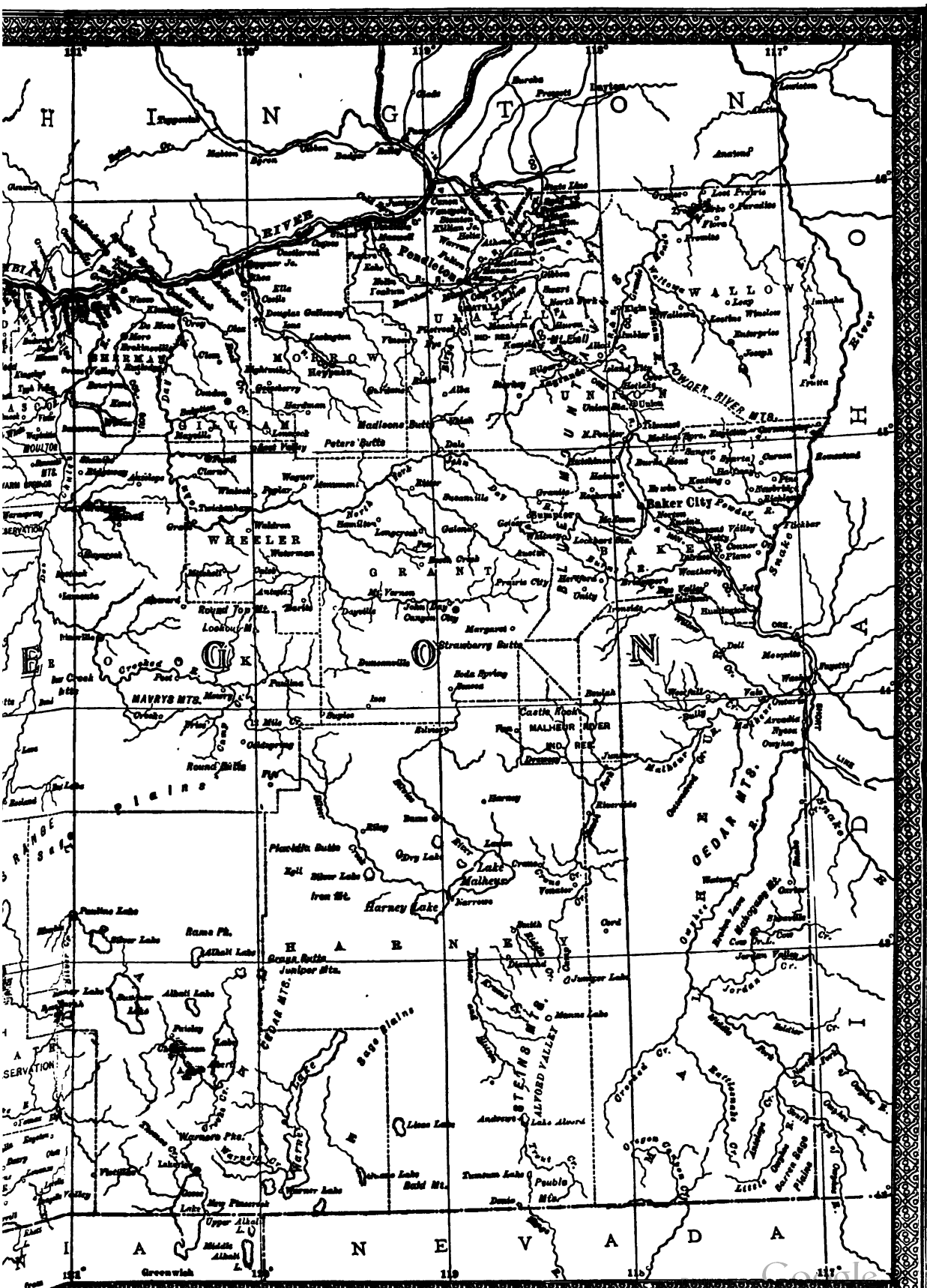


# OREGON

SCALE OF MILES  
0 10 20 30 40 50

Railroads-----  
State Capitals shown thus: (S)  
County Seats shown thus: (s)







## OREGON

timbered area, the destruction of timber by fire in this part of the State has been approximately 51,000,000,000 feet. Similarly, it appears that in the eastern part of the State the destruction amounts to about 3,000,000,000 feet, a total of 54,000,000,000 feet in the State. Thus, at \$1 per 1,000 feet, the average stumpage price, gives a total loss by fire of \$54,000,000. Much of this burned country is rapidly reforesting, and in 1904 was covered with a dense stand of young trees. The earliest burns in the State of which we have record occurred in 1843. From that time down to 1903, fires of greater or less magnitude have occurred yearly, mainly in the late summer and early fall, when everything is driest. The total stand of timber in the State is estimated at 213,398,000,000 feet. West of the crest of the Cascades, the total stand of timber is estimated at 171,780,000,000 feet. The total stand of timber upon the area east of the Cascades is only 41,618,000,000 feet, and the average stand per acre is 4,700 feet. There are about 4,000 wage-earners employed in this industry and the products are valued at \$10,000,000, as compared with 4,214 wage-earners and the products valued at \$6,530,757 in 1890. There were 776,978,000 feet (board measure) of lumber, exclusive of custom sawing, sawed in 1900, as compared with 470,146,000 feet in 1890. The importance of this industry is due to the remarkable forest lands of the State, over 4,500,000 acres of which have been recently set off by the United States government as a forest reserve.

**Agriculture.**—In western Oregon, notably in the valleys of the Willamette, Umpqua, and Rogue rivers, the soil is a rich, dark loam. The hills have a heavier soil and the mountains are suitable only for grazing. In the eastern part, the soil is sandy in general, and contains much alkali, but is very fertile under irrigation. In the northeast, extensive areas of naturally fertile wheat lands are found; in the southeast, the cultivation of crops is of very little importance, but the land is extensively used for grazing purposes. The total number of farms in Oregon in 1900 was over 30 times as great as in 1850, and 40 per cent greater than in 1890. The total acreage has also increased rapidly, being over 23 times as great as in 1850. In 1910 the principal farm crops were corn, 459,000 bushels, valued at \$367,000; wheat, 16,414,000 bushels, valued at \$13,788,000; oats, 10,419,000 bushels, valued at \$4,897,000; hay, 922,000 tons, valued at \$11,156,000; potatoes, 4,620,000 bushels, valued at \$3,234,000; and barley, 2,016,000 bushels, valued at \$1,250,000. Of the total value of crops, cereals, including corn, in 1900 were 42.5 per cent; hay and forage, 28.2 per cent; vegetables, including potatoes, sweet potatoes, and onions, 10.5 per cent; fruits and nuts, 6.7 per cent; and all other crops, 12.1 per cent. The average values per acre of the various crops were as follows: Flowers and plants, \$1,653; miscellaneous seeds, \$232; onions, \$196; grapes, \$157; nursery products, \$149; small fruits, \$111; sweet potatoes, \$70; hops, \$61; miscellaneous vegetables, \$59; potatoes, \$40; sugar beets, \$25; orchard fruits, \$13; and cereals, \$8.

The fruit-growing industry is most extensive in the region lying between the Cascade and Coast Ranges. The value of orchard products in 1900 was \$906,015, of which amount Jackson and Douglas counties contributed more than one third. From 1890 to 1900 the total number

of orchard trees in the State increased from 1,757,893 to 6,314,232. Of this increase the gain in plum and prune trees constituted 49.8 per cent, and that in apple trees, 34.2 per cent. The value of all vegetables grown in the State in 1900 including potatoes, sweet potatoes, and onions, was \$2,286,405. Aside from the land devoted to potatoes and onions, 15,494 acres were used in the growing of miscellaneous vegetables. Of this area 924 acres were devoted to the cultivation of cabbages; 601 to sweet corn; 573 to carrots; 372 to turnips; 331 to watermelons; 308 to tomatoes; 228 to beets; 110 to cucumbers; 101 to squashes; and 350 to other vegetables. In 1900, floral products, valued at \$95,872; sugar beets, to the value of \$63,332; hops, \$937,513; and small fruits, \$386,632, were sold by the farmers of Oregon.

PRODUCTION OF FRUIT IN 1900.

FRUITS	Number of trees	Bushels of fruit
	1900	1900
Apples.....	2,825,898	873,980
Apricots.....	10,869	1,665
Cherries.....	237,155	65,347
Peaches.....	281,716	101,190
Pears.....	374,165	112,225
Plums and prunes.....	2,517,523	359,821

**Irrigation.**—In western Oregon there is a very heavy rainfall and irrigation is not used for general crops, but water is artificially supplied in summer by a number of truck farms, and a few cases of irrigation of hay lands (resulting in an extra cutting) are reported from the southern part of this section. The greater part of the eastern section is arid, or semi-arid, but the soil, as a rule, is very productive when there is sufficient moisture. There are numerous rivers, and the available water supply of the section as a whole is large. In the counties bordering on the Columbia River, irrigation is not generally practised, and except in occasional years of small rainfall, it is unnecessary for most crops. A greater part of the territory south and west of these counties is useful, without irrigation, for grazing purposes only. In the Rogue River Valley in Jackson and Josephine counties, hay is the only crop usually irrigated, but a number of systems have been started or projected for the purpose of supplying orchard lands with water. The total number of irrigators in Oregon in 1900 was 4,636. The total area irrigated was 388,310 acres, of which 388,111 were irrigated from streams and 199 acres were irrigated from wells by the use of pumping plants. Of the total number of crops grown on irrigated land, 69.4 per cent represents the value of hay and forage; 15.0 per cent, the value of cereals; 9.6 per cent, that of vegetables; 3.1 per cent, that of orchard fruits; 2.1 per cent, that of small fruits. The total value of the crops grown on irrigated land constitutes 7.7 per cent of the total value of farm products for the State. The Umatilla project (1909) irrigates 20,440 acres more.

**Live Stock.**—There is excellent pasturage in Oregon, and horses, cattle, swine and sheep are raised in large numbers. On 1 June 1900, the total value of all live stock on farms and ranges, was \$33,917,048, of which 32.6 per cent represents



## OREGON

the value of neat cattle other than dairy cows; 25.5 per cent, that of horses; 22.3 per cent, that of sheep; 12.1 per cent, that of dairy cows; 3.1 per cent, that of swine; and 4.4 per cent, that of all other live stock. The following table shows the changes since 1850 in the numbers of the most important domestic animals:

YEAR	Dairy cows	Other neat cattle	Horses	Mules and asses	Sheep	Swine
1910.....	172,402	552,146	271,111	10,324	2,696,779	217,496
1900.....	122,447	577,856	287,932	7,751	1,961,355	281,496
1890.....	114,156	406,492	224,962	4,946	1,780,312	208,259
1880.....	59,549	356,693	124,107	2,804	1,083,162	156,222
1870.....	48,325	71,872	51,702	2,581	318,123	119,455
1860.....	53,170	100,961	36,772	980	86,052	81,615
1850.....	9,427	32,302	8,046	420	15,382	30,325

The number of dairy cows in Oregon in 1901 was almost 13 times as great as in 1850, and 7.3 per cent greater than in 1890. Nearly 18 times as many neat cattle, other than dairy cows, were reported in 1900 as in 1850.

**Manufactures.**—Oregon is destined to become one of the great manufacturing States of the West, if not of the entire country. The natural advantages of the State are extensive, furnishing material for its various manufacturing enterprises, and its streams furnish abundant power at The Dalles, Cascades, and Oregon City. The principal industries include railroad car and shop construction, canning, flouring mills, lumber and timber, printing, publishing, shipbuilding, slaughtering, meat packing, and the manufacture of woollen goods. In 1909 there were reported by the United States census, 2,247 manufacturing establishments, employing \$89,082,000 in capital, and 32,224 persons; and paying \$49,576,000 for raw materials, and \$23,951,000 in wages; and having an annual output valued at \$93,032,000. The 16 shipbuilding plants in the State in 1900 reported 338 wage-earners, and products valued at \$654,385, as compared with 14 establishments, 199 wage-earners, and products valued at \$320,715 in the same industry in 1890. Flour-milling reflects the large wheat-growing interests of the State, the production of this cereal amounting to 16,198,012 bushels in 1900. The flour-milling industry gave employment to 443 wage-earners in 1900, and had a product valued at \$6,364,023, as compared with 281 wage-earners in 1890 and products valued at \$4,184,473. The woollen manufacture gave employment in 1900 to 697 wage-earners, and had products valued at \$937,824, as compared with 358 wage-earners and products valued at \$614,932 in 1890. The importance of the woollen manufacture in Oregon is largely a result of the extensive stock-raising interests of the State.

**Commerce.**—Before 1868, the exports from Oregon were mostly to San Francisco and Honolulu, gold dust and ores forming three fourths of the shipments. Now the exports reach almost every part of the globe, and consist largely of wheat and timber products. The foreign commerce of the State from 1890 to 1900 has fluctuated from \$5,000,000 to \$15,000,000, about three fourths being exports. The largest export countries are Great Britain, China, and Japan. The principal port is Portland, on the Willamette, 12 miles above its junction with the Columbia. Another port is Astoria, at the mouth of the Columbia itself. There are excel-

lent harbors at Port Orchard, Rogue River, Coos Bay, Tillamook Bay, and Yaquina Bay. The imports of merchandise during 1900 aggregated in value \$1,519,517; and the exports, \$9,094,168.

**Banks and Banking.**—There was a private bank in Portland as early as 1858. In 1865 the

First National Bank, the first west of the Rocky Mountains, was established at Portland. In 1909 there were 70 national banks in operation, having 5,940 depositors and \$1,722,168.62 savings deposits. There were also 79 State banks, with \$14,531 depositors and \$9,417,941.81 savings deposits; and 9 private banks with 109 depositors and \$14,236.89 savings deposits; and 6 savings banks with 3,339 depositors and \$1,010,762.03 savings deposits. The exchanges at the United States Clearing House in Portland, during the year ending 30 Sept. 1909 amounted to \$358,614.300.

**Transportation.**—In 1865 there were but 19 miles of railroad in the State; 248 miles in 1875, and 582 miles in 1880. The total length of railroads within the State in 1901 was 1,695 miles, of which 58 miles were constructed during the previous year. Steamship lines ply regularly between San Francisco and Portland and other Oregon ports, and river lines operate on the Columbia, Willamette, and Snake rivers. The Union Pacific and the Southern Pacific are the two principal railroad lines.

**Government.**—New York and Iowa statutes were the models for the provisional government of Oregon, and subsequent legislation followed these lines. The governor is elected for a term of four years and receives a salary of \$1,500 per annum. Legislative sessions are held biennially, and are limited to 40 days each. The legislature has 30 members in the senate and 60 in the house, each of whom receives \$3.00 a day, and mileage. There are two Representatives in Congress. There is a supreme court, with appellate jurisdiction, the court consisting of five judges, who are elected for six years. There are nine circuit courts, having civil and criminal jurisdiction, and appellate jurisdiction from the county courts. There are county courts, with one judge, elected for four years, who is also judge of probate. The circuit court judges are elected one third every two years. There are also United States district and circuit courts. Justices of the peace are elected in every township or mining district, and municipal courts may be created. The constitution authorizes any male citizen of the United States, 21 years old, and 6 months a resident of the State, to be a voter, and any like foreigner who shall declare his intention to become a citizen one year before an election and shall have been a resident of the State for 6 months. New ballot laws, modeled on the Australian system, were adopted in 1891.

OREGON.



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CASCADES OF THE COLUMBIA RIVER.



## OREGON

*State Finances.*—There is no public debt in Oregon. The State revenue for the fiscal year ending 30 Sept. 1910 was \$1,917,191.02. This did not include revenue received from State School money loaned, nor for school lands sold. The interest on school loans was \$309,109.51. The expenditures for the year were \$1,831,577.07. The assessed value of real property was \$624,849,162.93; personal property \$220,038,545.81; total, \$844,887,708.74. The tax rate is \$5.70 per \$1,000. The constitution prohibits the legislature from contracting any State debt exceeding \$50,000, or assuming the debt of any county, town or corporation, except for purposes of war or to suppress an insurrection. The cash balance in the treasury is about \$1,000,000 annually.

*Public Institutions.*—At Salem are located the School for Deaf Mutes; State Insane Asylum; School for the Blind; Boys' Reform School; and the Oregon State Penitentiary. At Roseburg is located a Soldiers' Home.

*Education.*—In 1848, Congress gave the State an area of 3,387,520 acres of the public domain for free schools, and also gave 500,000 acres for a State university, and 90,000 acres for an agricultural college. The free school system has extended to every township in the State. In 1908 the children of school age numbered 130,221; the enrolment in public schools, 107,493; and the average daily attendance, 94,333. There were about 2,100 public schools, public school property valued at \$3,000,000, and 4,243 teachers. Their salaries for the year amounted to \$1,719,044, and total expenditures, \$2,786,722. For higher education there were 14 public high schools, 9 private secondary schools, 4 public normal schools, and 9 universities and colleges for men and for both sexes. The colleges include the University of Oregon, at Eugene; Pacific University, at Forest Grove; Willamette University, at Salem; Portland University, at University Park; Tualatin Academy, at Forest Grove; McMinnville College, at McMinnville; Pacific College, Newberg; Philomath College, Corvallis; and Blue Mountain University, at La Grande. There is a State agricultural college at Corvallis, and an Indian training school at Chemawa.

*Religion.*—The religious denominations of the State are given in the order of their strength and influence, as follows: Roman Catholic; Methodist Episcopal; Regular Baptist; Disciples of Christ; Presbyterian; Congregational; Methodist Episcopal, South; Protestant Episcopal; and United Brethren. There are about 1,500 Evangelical Sunday-schools, with about 15,000 officers and teachers and over 80,000 scholars.

*Indian Reservations.*—There exist in Oregon the remnants of a large number of Indian tribes, most of which are aboriginal to this region, representing more than 10 distinct linguistic stocks. They have been collected largely upon five reservations, namely, Grande Ronde, Klamath, Siletz, Umatilla, and Warm Springs, while some still live along or near the Columbia River and depend upon fish and game for their support. Grande Ronde reservation is situated in the northwestern part of Oregon, in Polk and Yamhill counties, and contains an area of 93¼ square miles. Approximately 10,000 acres are arable, being a fair quality of land, lying in the small valleys along the tributaries of the Yamhill

River. The Indians at Grande Ronde represent the remnants of nine small tribes: the Clackamas, Cow Creek, Lakmiut, Mary's River, Rogue River, Santiam, Umpqua, Wapete, and Yamhill, numbering in all 402. The larger number cultivate their own allotments and those of the infirm members of their families. Oats and wheat are their principal crops. Klamath reservation lies east of the Cascade Mountains, in Klamath and Lake counties, and embraces an area of 1,650 square miles. The tribes here are the Klamath, Modoc, Paiute, and Pit River, with a total population of 1,136. The Klamath and Modoc, who constitute the larger part of the population, have so intermarried that they can no longer be distinguished, and now form a single band. They are progressing in agricultural pursuits, and are giving more attention to their cattle than in former years. Umatilla reservation, comprising an area of 125 square miles, is situated in Umatilla County. Three tribes are located here, the Cayuse, Umatilla, and Wallawalla, the total population of the reservation being 1,397. Only 20 of the 65 farms on the reservation are operated by Indians, the others being leased to white men, or are the allotments of Indian families of white men who have married Indian women. Wheat is the principal crop, but barley, corn and oats are also grown. Warm Springs reservation lies in Wasco and Crook counties, in the north-central part of the State, and has an area of 725 square miles. The tribes at Warm Springs are the Des Chutes, John Day, Paiute, Tenino, Warm Springs, and Wasco, with a population of 837. Their farms are fairly well equipped with stock and implements, and a few are quite prosperous.

*History.*—There is much uncertainty surrounding the early explorations of the North Pacific coast. Spanish and English navigators undoubtedly reached the Oregon coast in the 17th century. Captain Cook landed at Mootka Sound in 1778, and the French navigator, Lapérouse, sailed along the coast in 1786. In 1789, two Americans, John Kendrick and Robert Gray, were sent out by Boston fur merchants, and in 1791 Gray gave the Columbia River its name. In 1805-6, the Lewis and Clark expedition explored considerable of the Oregon region. (See LEWIS AND CLARK EXPEDITION.) In 1811 the American Fur Company established trading posts at Astoria. (See ASTOR, JOHN JACOB.) The northwestern boundary between the United States and Canada was fixed by the convention of 1818, as the line of 49° from the Lake of the Woods to the Rocky Mountains. West of this point the territory was to be open to both parties for 10 years. (See NORTHWEST BOUNDARY.) By the convention of 1827, ratified in 1828, joint occupation was continued indefinitely. The Oregon question (q.v.) occupied the attention of Congress from 1820 to 1824. The Methodists founded a mission under Jason Lee in 1834, and the Presbyterians, under Marcus Whitman (q.v.) in 1836. In 1839 the emigration of New Englanders commenced overland by way of the South Pass, and the Territory continued to receive settlers yearly till 1848, when the California "gold-fever" attracted a large quota of her citizens away. In 1850, however, the land-donation law, passed by Congress, had the effect of registering 8,000 citizens in Oregon, which was formally organized as a Territory 3 March 1849.

## OREGON — OREGON QUESTION

On 2 March 1853, Washington Territory was formed out of the northern half of Oregon. On 5 Nov. 1857, a State constitution was adopted; and 14 Feb. 1859 the State was admitted into the Union by Act of Congress under the constitution previously ratified. From 1845 till 1855 a desultory warfare was kept up with the Indian aborigines, and a resumption of the same occurred in 1858, and again in 1866-8, when occurred the Shoshone war, and in 1864-73, when the Modoc war prevailed. Since 1875 the Indians have been confined on the reservations. Since 1890 Congress has made numerous large appropriations for river and harbor improvements.

**Politics.**—Under the provisional government 1843-5, adopted by the people 5 July 1843, the executive power was vested in a committee of three persons; the legislative power was vested in a committee of nine persons, elected by the qualified electors, giving to each district representation in ratio of its population, excluding Indians; the judicial power was vested in a supreme court, consisting of one supreme judge and two justices of the peace, and a probate court. Oregon had a provisional governor (1845-9) and seven Territorial governors (1849-59). The first governor under the State constitution was a Democrat. In Presidential elections the State is regarded as safely Republican, it having gone Democratic in Presidential elections only in 1868, and split the vote in 1892. In 1876 it was discovered that one of the Republican electors held a Federal office, and was consequently ineligible. The Democratic governor issued a certificate to the minority candidate, but the two Republican electors filled the vacancy, and their position was sustained by the Electoral Commission (q.v.).

**Population.**—There are 34 counties in Oregon, as follows:

Baker,	Lane,
Benton,	Lincoln,
Clackamas,	Linn,
Clatop,	Malheur,
Columbia,	Marion,
Coos,	Morrow,
Crook,	Multnomah,
Curry,	Polk,
Douglas,	Sherman,
Gilliam,	Tillamook,
Grant,	Umatilla,
Harney,	Union,
Hood River,	Walla-wa,
Jackson,	Wasco,
Josephine,	Washington,
Klamath,	Wheeler,
Lake,	Yamhill.

The principal cities and towns are as follows: Portland (207,214); Astoria (9,599); Baker City (6,742); Salem, Oregon City, Albany, Corvallis, Eugene City, Roseburg, The Dalles, Pendleton, Union, and La Grande. In 1901 there were 890 post-offices of all grades; and 193 periodicals, of which 17 were daily, 7 semi-weekly, 144 weekly, 1 bi-weekly, 2 semi-monthly, and 22 monthly. The total population of the State in 1850 was 13,294; (1860) 52,465; (1870) 90,923; (1880) 174,768; (1890) 313,767; (1900) 413,536. Of this number 65,748 are of foreign birth. Population (1910) 672,765.

**Bibliography.**—Barrow, 'Oregon, the Struggle for Possession' (1882); Bancroft, 'History of the Northwest Coast' (1884), and 'History of Oregon' (1888); Bulfinch, 'Oregon and Eldorado' (1866); Gray, 'History of Oregon'

(1870); Greenbow, 'History of Oregon and California' (1844); Mosely, 'Oregon, Resources, Climate and Products' (1878); Mowry, 'Marcus Whitman and the Early Days of Oregon' (1901); Nash, 'Two Years in Oregon' (1882); Nicolay, 'Oregon Territory' (1846).

C. A. DOLPH,

**Oregon, Ill.,** city, county-seat of Ogle County; on the Rock River, and on the Chicago, Burlington & Quincy railroad; about 85 miles in direct line west of Chicago. It has considerable manufacturing interests. The chief manufactures are foundry and machine-shop products, flour, pianos, street-sprinklers, and dairy products. It has good schools and a public library. Pop. (1910) 2,180.

**Oregon,** a river in the western part of North America. See COLUMBIA.

**Oregon, University of,** the State University chartered in 1872, and opened in 1876 at Eugene. Its organization comprises (1) the College of Literature, Science and Arts, which offers courses in law, journalism, business, and pedagogy; (2) the College of Science and Engineering, with courses in civil, chemical, electrical, mining, and sanitary engineering; (3) the School of Music; (4) the Graduate School; (5) the School of Law (founded in 1884); (6) the Medical School (founded in 1887); the two latter are located at Portland; there is also a University Academy. The bachelors' degrees conferred are A.B. and B.S. The University is coeducational, number of women students being about 30 per cent of the total. It is supported mainly by State appropriation; tuition is free; the income in 1910 was \$138,000. The library (1910) contains 30,000 volumes; the students number 1,130, and the faculty 125.

**Oregon City, Ore.,** county-seat of Clackamas County; on the Willamette River, and on the Southern Pacific railroad; about 14 miles south of Portland. The falls in the river, 40 feet in height, furnish extensive water-power which is used for the electric-light works and for the development of manufacturing industries. The chief manufactures are flour, lumber, woolen goods, soap, paper, pulp, and furniture. It has a House of the Good Shepherd, public and parish schools, and a public library. The city owns the waterworks. Pop. (1890) 3,062; (1900) 3,494; (1910) 4,287.

**Oregon Brook-trout,** the rainbow trout (q.v.).

**Oregon Question, The.** The Oregon question of boundary between the United States and Great Britain involved the right to the territory upon the Pacific coast of North America extending inland eastward to the Stony, now called Rocky Mountains, and bounded upon the south by the parallel of 42° north latitude, upon the north by the parallel of 54° 40' marking the southern limit of what was formerly Russian America. The claim of the United States to this territory was based upon the discovery, 11 May 1792, of Captain Robert Gray of Boston, who, in the ship Columbia, entered the river called Oregon by the Indians. "He passed its bar and anchored in the river, ten miles above its mouth," and "afterwards sailed up the river 12 or 15 miles and left it on the 20th of the same

## OREGON QUESTION

month, calling it Columbia after his ship." (J. C. Calhoun.)

A second claim was based on the exploration of Meriwether Lewis and William Clark sent out with a party by the United States government, in 1804, across the newly purchased Louisiana territory. They followed the Missouri River to its headwaters, crossed the Rocky Mountains, reached the Columbia River and followed it down to the Pacific. They encamped on the north side of the mouth of the Columbia, on Cape Disappointment, wintering there. 1805-6, and returned to Saint Louis in September 1806. "It was this important expedition which brought to the knowledge of the world this great river, the greater by far on the western side of this continent, with its numerous branches, and the vast regions through which it flows above the point to which Gray and Vancouver had ascended." (Calhoun.)

Priority of settlement was claimed for the United States on account of the settlement made by the party sent out under the Company of which John Jacob Astor was the head. "Early in the spring of 1811, they made their establishment on the south side of the (Columbia) river, a few miles above Point George." (Calhoun.) Great Britain took this post and others in 1812 after the beginning of war between the United States and Great Britain. By the first article of the Treaty of Ghent, 1814, which terminated the war, the posts were restored to the United States, the formal transfer occurring in 1818.

Our last item of claim was based on the Treaty of Louisiana in 1803, with France, and the Treaty of Florida in 1819, with Spain. By the latter, Spain conveyed to the United States all her rights, claims and pretensions to the country west of the Rocky Mountains and north of the 42d parallel. By the Treaty of 20 Oct. 1818, between the United States and Great Britain, the boundary line between the United States and British America was fixed on the 49th parallel from the Lake of the Woods to the Rocky Mountains. West of the Rocky Mountains, the line was not defined, but it was agreed that the Oregon country with its harbors, bays and rivers, be open for the term of 10 years to the vessels, citizens and subjects of either power. The boundary was left unsettled and the agreement above specified was renewed in 1827 except that the time was left indefinite and the agreement terminable at the discretion of either power upon a 12-months' notice to the other. The country in question was a wilderness traversed by the hunters and trappers of the Hudson Bay Company and the Indians, the possession of which was not considered an issue of the first importance. In 1843 President Tyler's annual message called the attention of Congress to the Oregon boundary and stated the United States claim as embracing the country from the 42d parallel to that of 54° 40'.

The claims of Great Britain were similar to the claims of the United States. In 1778, the English Captain Cook visited and explored the northwest coast of America from latitude 44° northward. In 1792, 1793, and 1794, Captain Vancouver, for the English, surveyed the coast and its adjacent islands. In point of "accuracy and authenticity" these discoveries were said to be superior to those of any other country.

"In 1793 Mackenzie, a British subject, had crossed from the Rocky Mountains to the Pacific, exploring the upper waters of Fraser's River, which in process of time was traced to its junction with the sea near the 49th degree of latitude, thus forming in point of exploration a counterpoise to the exploration of that part of the Columbia which was first visited by Lewis and Clark." (R. Pakenham.) An English expedition intended to anticipate the Astoria settlement, was a little late, not reaching Astoria till July 1811. Great Britain denied the validity of the Spanish claim to the Oregon country, practically on the ground that she was so much stronger than Spain that Spain could not make good her claim. The above claims and counter claims, with various modifications, were discussed at times by the diplomatic representatives of Great Britain and the United States from 1826 to 1846.

The Oregon question as an issue in American politics was made prominent by a plank in the platform of the national convention of the Democratic party at Baltimore, the latter part of May 1844, which read, "Resolved, That our title to the whole of Oregon is clear and unmistakable, that no portion of the same ought to be ceded to England or any other power, and that the reoccupation of Oregon and the reannexation of Texas at the earliest practicable period are great American measures which this convention recommends to the cordial support of the Democracy of the Union." The words reannexation and reoccupation implied that the territory in question had belonged to the United States, Texas under the Louisiana purchase and Oregon by discovery, exploration, etc., till the United States left the claim to sovereignty over Oregon in abeyance by the convention of joint occupancy with Great Britain. It must be recognized that in 1844 the United States had no undisputed sovereignty over the territory on the Pacific coast now belonging to the United States. Joint occupancy with Great Britain of the Oregon country was not sovereignty over it. The California country belonged to Mexico. If the sovereignty of the United States was to extend from ocean to ocean, that power must acquire the California country from Mexico or exclude England from Oregon. The settlement of the Oregon boundary had been discussed for some time previous to 1844 and it had been hoped that the treaty which was negotiated in 1842 between Mr. Webster and Lord Ashburton, fixing the line between Maine and Canada, would also fix the Oregon line, but such was not the case. James Buchanan, in a speech in the Senate, 12 March 1844, upon a resolution requesting the President to give notice of the termination of the joint occupancy of the Oregon country, pointed out clearly that England leased that territory to the Hudson's Bay Company in December 1821 for 21 years and in 1838 renewed the lease for 21 years more; that the Hudson's Bay Company had 6 permanent establishments on the coast, 16 interior, and several migratory hunting parties, 6 armed vessels, one of them a steamer; that they hoped to keep British interests on the ascendant in the Pacific. Mr. Buchanan also showed that Great Britain was content to keep the *status quo* and that the only way to force her to act was to give the notice. The plank in the Democratic platform was considered de-



cidedly aggressive in some sections of the country. As might have been expected, New England and the sections whose cities and shipping would be more at the mercy of the enemy in case of war were not so enthusiastic for an aggressive foreign policy as those States in the centre, west and south of the Union which were more remote from the "firing line" and which were deeply interested to see the flag of the Union sweep through from "sea to sea." The discussions in Congress revealed calculation of the probabilities of war as the result of the notice. It was urged that Ireland was hostile to England and there might be a rebellion. Far more important was the fact that England received nine tenths of her cotton from the southern United States, that war would cut off this supply and close the English mills with all the social distress involved, to say nothing of the loss of the market the United States afforded for English manufactured products. In 1844, one third of the foreign trade of the United States was with Great Britain. After Mr. Polk's nomination, it was brought out in the proceedings of Congress in June 1844, that so far back as the session of 1828-1829, he had laid out a definite plan of policy for the United States including giving the notice and taking the consequences. When, therefore, Mr. Polk was elected in November 1844, the Democratic party considered its platform approved by the country and it proceeded to carry out its policy of territorial aggrandizement. The cry of "54° 40' or fight" phrased the ultra aggressive sentiment on the part of the United States looking to push its territory to the Russian line, while Great Britain seemed equally determined to force the line of the Columbia River. War with Great Britain might involve the loss to the United States of all the Pacific coast. Mr. Blaine in his 'Twenty Years of Congress' attributes the emergence from a difficult situation to the foresight and ability of Mr. Calhoun and of Mr. Buchanan. These gentlemen as well as Mr. Clay and Mr. Webster, when occupying the post of Secretary of State, had been willing to continue the line of 49° to the Straits of Fuca. There were serious objections to the Columbia River line. The most important of these, barring considerations of national honor and pride, was the fact that there were no good harbors in the territory left to the United States south of the Columbia, whereas, if the line ran, as it does at present, on the 49th parallel to the Straits of Fuca, all Puget Sound with its waters sheltered from the storms of the Pacific and its branches accessible to a very large territory, would belong to the United States. San Francisco harbor then belonged to Mexico. Within the United States, sentiment was divided. War with England would hurt the South seriously by cutting off her cotton market and possibly limiting what might become slave territory to the Southwest. The anti-slavery sentiment of the North had defeated Mr. Clay for the Presidency for his willingness to compromise on an issue on which it would brook no compromise. President Polk was a friend of General Jackson and peace was not an idol at whose shrine Jackson worshipped. The influence of other public men looking toward peace, their interests and rivalries, were to be considered. The Administration escaped from its "54° 40' or fight"

position by taking the advice of the Senate in advance of the treaty. This course, unusual and in some cases highly undesirable, shifted the responsibility for action upon the shoulders of the Senate, at the same time allowing the Secretary and Great Britain to feel that the instructed action of the Secretary could not consistently be rejected by the Senate. It cleverly rescued the Administration, for if the Whigs insisted upon the line of 54° 40', they put themselves squarely upon democratic ground. If they were willing to compromise on 49° for the sake of peace, it would hardly seem reasonable to taunt the Democrats with cowardice for acting upon Whig advice. When the resolution of notice passed the House in February 1846 "the country at once became alarmed by the growing rumors that the resolution of the House was a direct challenge to Great Britain for a trial of strength as to the superior title to the Oregon country." (J. G. Blaine.) The resolution, amended by the Senate and given a conciliatory tone, passed Congress 23 April 1846. By that time the Administration must have seen its future course clear, for by the middle of June the diplomatic representatives of Great Britain and the United States had come to an agreement which was ratified by the respective countries and proclaimed in force in August 1846. The line agreed upon was the parallel of 49° to the Straits of Fuca, thence following the middle, roughly speaking, of that Strait to the Pacific. War with Mexico broke out contemporaneously with the passage of the amended Oregon notice to Great Britain and as a result of the war with Mexico and the Oregon treaty with Great Britain, the United States acquired its present sovereignty over the great territory west of the Rocky Mountains with a frontage of some 1,500 miles on the Pacific.

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**Oregon Robin.** The "varied thrush" (*Merula naxia*) which represents the eastern robin in Oregon and northward to Alaska west of the mountains. It is dark slate-blue above and orange-brown in the lower parts, with a crescent of black on the breast, from the horns of which a line of black leads along the neck and through the eye. It makes its nest in bushes, and lays greenish blue eggs, clearly marked with spots and points of dark brown. It is a sweet singer.

**Oregon Snow-bird.** See SNOW-BIRDS.

**Oregon State Agricultural College,** founded in 1870 at Corvallis. The four years' courses include agriculture, domestic science, mechanical, electrical, and mining engineering, and pharmacy, there are also a two years' course in mining, a two years' business course (added in 1901), and a winter course of four to six weeks in agriculture; and a preparatory department with a one year's course. The college is co-educational, and there are women on the faculty. The Experiment Station is connected with the college, though separately supported; and farmers' institutes are organized under supervision of the faculty; in 1901, 11 such institutes were held with an attendance of 3,100. The income is derived chiefly from the land grant fund of 1862, and from Federal and State appropriation; tuition is free; in 1910 the annual income

## OREGON STURGEON — OREOPITHECUS

amounted to \$393,000. In that year there were 1,592 students in attendance, and 103 members of the faculty.

**Oregon Sturgeon.** See STURGEON.

**O'Reilly, ô-rî'li, Alexander,** Spanish soldier: b. Dublin 1725; d. Murcia 23 March 1794. He entered the Spanish army when a boy, fought the Austrians in Italy, joined the Austrian army in 1757, and the French in 1759, and then returned to Spain. He served in the war with Portugal (1762), acted as governor of Havana, rebuilding the fortifications dismantled during the British occupation, became governor of Louisiana in 1769, and acted there with great severity until his authority was established, when he showed himself attractive and liberal. He was governor of Madrid during the rising of 1765, commanded an unsuccessful expedition to Algiers in 1775, but still retained the king's favor. After the death of Carlos III. (1788) he was disgraced and retired from the army; he was subsequently appointed to the chief command of the Spanish army in 1793, but died suddenly before reaching his army.

**O'Reilly, John Boyle,** Irish-American author and journalist: b. Dowth Castle, County Meath, 28 June 1844; d. Hull, Mass., 10 Aug. 1890. He was apprenticed to a printer at nine, became a compositor and a reporter, and was an active member of the Fenian Society, in whose interests he enlisted in May 1863 in the 10th Hussars. Three years later he was tried for treason and sentenced to death, a sentence commuted to 20 years' penal servitude. From Dartmoor he was transported in 1867 to Australia, whence he escaped and, having been picked up by an American ship, made his way to Philadelphia, where he was naturalized. He removed to Boston almost immediately, and became editor of the 'Pilot' in 1870 and part owner in 1876. He accompanied the Fenian raid of 1870 as press correspondent, and was a prominent advocate of Home Rule for Ireland. He wrote some good verse, notably that on Australian themes: 'Songs of the Southern Seas' (1873); 'Songs, Legends, and Ballads' (1878); 'America' (1882), and 'In Bohemia' (1886); and in prose, 'Moon-dyne,' a novel dealing with penal life (1879); 'The King's Men' (1884, with Robert Grant, J. S. of Dale, and J. F. Wheelwright); 'The Irish Question' (1886); 'Ethics of Boxing and Manly Sport' (1888), and 'Stories and Sketches' (1888). Consult the biography by Roche (1891).

**Orel, ô-rêl, or Orloff,** Russia, (1) a town, capital of the government of same name, on the Oka, 201 miles southwest of Moscow. It consists of narrow streets and houses built principally of wood, and has manufactures of linen, tanneries, rope-works, worsted-mills, etc. It is well situated for trade, communicating by water with the Black Sea, the Caspian, the Baltic, and forming an important entrepôt, especially for Saint Petersburg and Moscow. Pop. (1897) 60,858. (2) The government has an area of 18,000 square miles, the surface being diversified with hill and valley, and watered by the Oka, the Desna, the Don and its tributary the Sosna. Stock raising and agriculture constitute the chief industries.

**O'Rell, Max.** See BLOUET, PAUL.

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**Orellana, Francisco,** frân-thês'kô ô-rêl-yâ'nâ, Spanish explorer of the Amazon: b. Truxillo, Spain, about 1500; d. Brazilian Guiana 1550. He was a friend and fellow townsman of Pizarro, fought under him in Peru, founded the city of Guayaquil in 1537, and in 1540 accompanied the expedition across the Andes in search of El Dorado, and sailed down the Napo River with a few men to the Amazon, which he followed to its mouth, and, because of the stories he heard of women warriors and women chiefs along its course called it the Amazon. Upon his return to Spain he told amazing stories of the richness of the country he had explored and received its government in 1544. He was killed soon after his return to South America, where his expedition was entirely unsuccessful. Consult the contemporary account of his travels by his chaplain, Gaspar de Carvajal, reprinted at Seville in 1894.

**Orenburg, ô'rên-boorg,** Russia, (1) a town, capital of the government of the same name, on a slope above the right bank of the Ural, 990 miles southeast of Moscow. It has spacious and regular but ill-paved streets. The principal buildings are several stone churches, two mosques, a governor's house, exchange, custom-house, merchant-house, and Bashkir caravansary. The chief manufactures are woollens, partly for army clothing, leather, and soap. There are also many large tallow-melting houses. The trade, carried on principally by caravans from Khiva and Bokhara, is very extensive. Pop. about 75,000. (2) An eastern government in the southern Urals, with an area of 73,816 square miles. It has celebrated deposits of gold, copper, silver, coal, iron, and salt, which are extensively worked. Pop. about 1,650,000.

**O'reodonta, an extinct family (*Oreodontidae*)** of ungulates, the remains of which occur in the early Tertiary deposits of North America, and are among the most primitive of hoofed mammals. Their skeletons abound in the Lower Miocene formations of Colorado and northward, especially in the White River beds. They are mainly animals not larger than sheep, with a very long tail, and with four functional toes on each foot. The dentition is usually complete, though the incisors are sometimes rudimentary or even wanting in the upper jaw; and all the genera exhibit, says Woodward, one very peculiar feature, namely, the degradation of the lower canine to the rank of an incisor, while the foremost premolar is enlarged to usurp its function in opposing the moderately large upper canine. The best known genera are *Oreodon* and *Agriochærus* of the eastern foothills of the Rockies, and the larger *Eporœodon* of the Pacific coast. Consult Woodward, 'Vertebrate Palæontology'; Osborn, 'Evolution of the Ungulate Foot,' Trans. Amer. Philosophical Soc., U. S., Vol. XVI. (1889); Cope, 'The Artiodactyla,' Amer. Naturalist, 1888, and 1889.

**Oreopithæcus,** the generic name given to the oldest known fossil ape, fragments of whose skeleton (jaws and teeth) have been recovered from the Middle Miocene of Tuscany. They are interesting as exhibiting a comparatively large animal (*O. bamboli*), showing resemblances both to the *Cercopithecida* and to the *Simiæda*,

"as if," remarks Woodward, "they represented an annectant ancestral type."

**Orestes**, ô-rës'têz, in Greek mythology, the son of Agamemnon and of Clytemnestra. In several Greek tragedies he is represented as the deliverer of his sister, and the avenger of his father, by becoming the murderer of his mother. Orestes, saved by his tutor with the assistance of Electra from the fate of his father, was brought up in the house of his uncle Strophius, prince of Phocis, and formed with his son Pylades that intimate friendship which has become proverbial. Called upon by the Delphian god to avenge his father, he hastens back to Mycenæ. To conceal himself he has recourse to artifice. His tutor and Pylades appear with an urn, which they pretend contains the ashes of Orestes. Clytemnestra hears the news of her son's death with a joy which she can hardly conceal; but she soon falls under his dagger. Ægisthus undergoes a similar fate. According to the Greeks, the murderer of his mother became a prey to the Eumenides or Furies. These terrible goddesses unrelentingly pursue the unhappy prince, and at last drive him to madness.

**Orfila**, ôr-fê-lâ, **Mathieu Joseph Bonaventure**, French chemist, founder of the science of toxicology both in its therapeutic and legal bearings: b. Mahon, Minorca, 24 April 1787; d. Paris 15 March 1853. He served in the merchant marine, studied medicine at Valencia, Barcelona, and Madrid; was sent to Paris by the Spanish government in 1807; and after the loss of his pension consequent on the war between France and Spain lived there in poverty for a time. By 1811 he had become doctor of medicine, and his successful practice and marvelous knowledge of chemistry made him quickly famous. He was naturalized, became professor of toxicology (1819) and of chemistry (1823), and was dean of the medical faculty from 1830 to 1848. He was famed as an expert witness, did much to reform French medical education, and wrote: 'A Treatise on Poisons' (1813); 'Treatise on Legal Medicine' (1847); 'Elements of Medical Chemistry' (1817); 'Treatise on Exhumation' (1830), his most able work; and 'Researches on Arsenious Acid Poisoning' (1841).

**Orford**, ôr'fôrd, **Earl of**. See WALPOLE, SIR ROBERT.

**Organ**, a functional part of living being. It is an essential quality of a living being (see LIFE) that it shall exhibit activities, the expression or product of organic constitution. Hence, in fact, living beings are said to be organic or to have organization as distinguished from the homogeneous, non-vital character of gases and minerals, which are inorganic. Any living being, either vegetable or animal, is hence termed an organism—the broadest possible name for the animate world as opposed to the inanimate. *Historical Sketch*.—The erroneous notions which formerly prevailed in regard to the nature of organic functions belong to the history of the science of physiology and of chemistry, and need not be dwelt upon here further than is necessary to clear up the present meaning of certain terms. Up to the early part of the 19th century it was believed that certain chemical compounds which were produced as the results of vital processes occurring within the tissues

of animal and vegetable organisms could not be obtained by the ordinary methods of the chemical laboratory; and these compounds were, for this reason, designated as organic. Wöhler, in 1828, however, discovered that urea, the most important solid constituent of urine, could be obtained "artificially," as it has been called, from inorganic materials. Since that date a very large number of so-called organic compounds have been prepared artificially, so that the original signification of the term "organic" does not hold any longer; and the old conception of an organism as an engine-like collection of organs with fixed functions is disappearing before the doctrine that it is the protoplasm or living stuff in all parts of the body that is the basis of all vital activities. The title "organic chemistry" is now commonly applied to the chemistry of the compounds of carbon, whether these compounds are obtainable only as the products of vital processes or not.

*Nature of Organs*.—Organs may be spoken of in two senses. In common speech they are large functional parts of gross anatomy, such as the roots, the leaves, or the blossoms of plants, the limbs, the heart and blood-vessels, the lungs, the stomach, the liver and excretory glands, the generative parts, etc., of animals; these are termed, properly enough, the respiratory, digestive, locomotive, or reproductive organs, and so on. But each is made up of many parts which unite to effect the great functions which characterize the group as a whole, and all are more or less interdependent. The number and diversity of these structures, large and small, visible and invisible, vary enormously in different plants and animals, and are the result of an organic evolution, that is, a struggle for existence among organs, or intra-evolution, as it has been termed by some German naturalists. Where the organs are few and simple, in some cases more than one distinct function being performed apparently by the same part, the animal or plant is said to be of simple or synthetic structure or organization: where the subdivision of labor in the organism is extensive, separate structures doing each a more particular work for the benefit of the whole, the organization is said to be complex or specialized. Increase of specialization is regarded as an advance, hence we speak of "lower" and "higher" animals, referring to the less or greater degree of complexity and specialization of their organs, or comparing their organizations as a whole. Comparison of existing organisms, considered with reference to their activities, and a study of the phylogeny of animals and plants as revealed by palæontology and embryology, establishes the truth of this standard of comparison, and throws light upon the evolution of organs. Tracing backward any particular group, as, for example, that of the digestive system, we find it less and less complex as we descend the scale of organization until we arrive at the simplest forms—the one-celled moners (see MONER; PROTISTA), in neither plant nor animal, which have no structure that our power is able to detect, the drop of undifferentiated protoplasm which constitutes their whole being accomplishing all the work of nutrition, locomotion and reproduction. A little higher stands the amoeba (q.v.) and other protozoans and protophytans, in which a beginning of differentiation and

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structure appears in the presence of a nucleus, a vacuole, microsomes, etc. Still higher stand the sponges, coelenterates, and so on, whose comparative superiority is manifested by the assignment of certain parts with gradually increasing definiteness to perform distinct offices. But the higher organisms primarily differ from the lower ones only in the fact that they are composed of many cells in more and more complicated arrangement, while the lowest consist of only a single cell; hence in the last analysis, an organ can be defined only as a cell or group of cells devoted to doing a special part of the labor required for the continued life, activities, and prosperity of the organism. This is only a corollary of the general doctrine of the cell as the seat of life (see CELL). Of the origin of function or organic activity we know nothing.

*Form and Symmetry.*—Returning now to the ordinary sense of the word "organ" as a functional part, certain general facts may be considered. Among these are the form and symmetry of organs. The form is determined by the work to be done, the organ as an instrument assuming that shape and relative position in the body, and acquiring that structure, which will be most effective for the purpose. Many of the problems here which seemed so difficult to early investigators have been solved by the application of mechanical laws. Mechanical principles, controlling, to begin with, the original cell-division of the egg, and regulated in growth by external conditions, as gravity, air or water pressure, strains, muscle-leverage, etc., are no doubt at the basis of the symmetry which so remarkably characterizes the arrangement of organs throughout the living world. Two general types may be recognized—radial symmetry and bilateral symmetry. The former is most characteristic of plants, where the majority of organs occur in circles around an axis (see ANATOMY OF PLANTS; FLOWERS; PHYLLOTAXIS; VENATION; etc.); and of such animals as the echinoderms, coelenterates (qq.v.), and many worms, whose organs are radially disposed about an oral-aboral axis, as in polyps and starfish. The superior orders generally, and the arthropods and vertebrates particularly, display bilateral symmetry in a marked degree in all their outward parts, the external organs being in pairs (with one important exception in the higher forms) and these approximately, though not absolutely, alike. The internal organs of the vertebrates are by no means symmetrical at present, although they seem to have reached their asymmetry by evolution from a primitive paired condition. In insects and arthropods generally the internal parts show much more bilateralism. Among mollusks the bilateral arrangement of the organs is normal, but one side is often developed at the expense of the other, even to the complete loss of the latter.

*Correlations.*—As might be expected under such circumstances certain definite correlations exist between organs as to size and relative proportions. Thus in the human frame, the limbs are equal in length, the head is one seventh of the total height, the internal organs must be of a relative size in respect to one another and to the frame, and so on. This symmetry and correlation of organs is necessary to the continuance of healthful interacting functions.

At the same time homologous parts—that is, those structurally alike—may vary greatly among animals of the same class, according to the varying requirements of habits and environment, as for instance among vertebrates, the locomotive organs are in the form of fins or paddles for aquatic species, wings for aerial creatures, and legs and feet for those of terrestrial habit; and these may be vastly modified among the different groups, adapted to diverse habits, giving all the difference, for example, between the massive, shovel-like, digging-paws of the mole and the long slender legs of the antelope, or even the total disappearance of homologous parts, as in the snakes and limbless lizards. Such alterations of form adaptive to the requirements of environment and habit, come about gradually, and are likely to require a corresponding change in other organs, directly or indirectly; since all or many organs in the frame are dependent upon the co-action of others, and conditions of space, gravity, etc., require mechanical as well as physiological conformity. The stomach, lungs, etc., of a long slim animal will be elongated and narrow, while those of a related but more compactly built species will be more globular. Sometimes, however, the changes render some secondary organ unnecessary, and it continual disuse results in its gradual reduction and perhaps extinction, as has happened in the case of the loss of eyes by many burrowing or cave-dwelling animals. When such a loss has become permanent in a type the remains may occur only in the embryonic stage, or may exist in adulthood, quite useless to the animal in its present condition. Such obsolete structures, of which the false hoofs of many ungulates, the "balancers" of flies, and the appendix vermiformis in man are examples, are called vestigial organs, and were most difficult of explanation until this relationship was recognized.

*Function Change.*—Organs may not only change their form, but may also change their function. Many perform more than one function, even in the higher animals, and often, especially in the case of the limbs, this has produced a change of form as between the fore- and hind limbs, relegating to one pair, say the hind limbs, the main work of progression, while the other pair assist in this respect only a little, but serve mainly as the means of seizing and holding food; most of the rodents afford examples of this case, of which the kangaroos and iguanodons are extreme instances. But function-change has often been more radical, the original or primary service by an organ having been completely superseded by some other service, to accomplish which the organ underwent gradual transformation in accordance with change of habit and the arising of a novel bodily need to which existing machinery could be adapted. The origin of lungs in air-breathing amphibians, reptiles, and warm-blooded mammals and birds is directly traceable to the transformation for this new purpose of the swimming-bladder of fishes; teeth came into existence as a relic of the hard scales of ancient fishes whose function was purely as an armature, the structure and office surviving only in a few such forms as the gar (see GAR); the three pairs of "jaws" of crabs are structures which, in the early history of the

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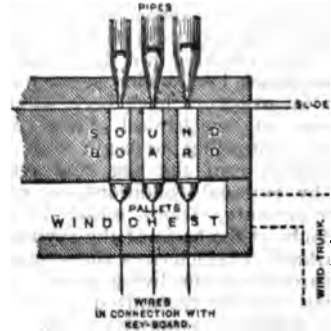
crustacean type were primarily swimming and breathing organs, but long ago lost those functions altogether and became fitted wholly for mastication of food. Similar examples in great number might be drawn from both animals and plants. Indeed, it might be said that most if not all of the successful and persistent variations have involved change of function on the part of organs, the result of which in many cases was greater specialization.

For development of organs in the embryo see EMBRYOLOGY.

ERNEST INGERSOLL.

**Organ** (Gr. *ὄργανον*, Lat. *organum*, an instrument), a name at the present time applied to several musical instruments that are in construction and principle somewhat closely allied; but more distinctively appropriated to the largest of these, the church organ, which may be briefly described as a wind instrument, the sounds of which are those of a great number of pipes of varying lengths, and are produced by the admission to these (as determined by the keys and stops moved by the performer) of compressed air conveyed to them along certain channels, from a bellows worked by electricity, human or other motive power. This, which from its essential feature of construction is also named the pipe organ, and, from the mode of playing, the finger organ, is incomparably the noblest and most imposing of musical instruments, being in majesty of tone and grandeur of effect quite without a parallel. As in the human voice, the tones of the organ are produced by the vibrations of the air in the tubes or pipes through which it is propelled. The three essentials of an organ are: (1) a chest of compressed air; (2) a set of pipes in communication with this chest; and (3) a clavier or key-board, by means of which this communication may be opened or closed at pleasure. The air is forced into the wind-chest by means of bellows. To the upper part of each wind-chest is attached a sound-board, a contrivance for conveying the wind to any particular pipe or pipes at pleasure. It consists of two boards laid horizontally. On the upper board are arranged parallel rows of pipes, the pipes in each row, regarded longitudinally, being of the same timbre or quality of tone, but of a different quality when regarded laterally, that is, as they extend backward. Under each lateral row of pipes there is a groove or channel in the sound-board for the passage of air from the wind-chest to the perforations in the sound-board by which the pipes communicate with the grooves. Air is admitted into these grooves by means of valves or pallets, which are connected with the keys. On the depression of a key the valve is opened, and the compressed air rushes into the groove, and would, it is obvious, cause all the pipes communicating with that particular groove to sound their respective notes were it not for the register. The register is a slider which moves in other grooves in the sound-board, cut at right angles to those above mentioned, and communicating by perforations with the longitudinally arranged pipes; it contains holes to correspond with these pipes. By drawing the register or stop the holes of one of these rows are opened, as then the holes of the slider are directly under the entrance to the pipes, and by pushing it they are closed. From this it is clear that

by drawing several of these registers corresponding rows of pipes are opened. When a register is open air can be admitted into any of the row of pipes under which it is placed by simply pressing the key that opens the valve of the groove with which it communicates. The series of pipes above each slider is called a stop. The principal stops of an organ are the open, stopped, and double diapasons; the principal, dulciana, twelfth, fifteenth, flute, trumpet, clarion, bassoon, cremona, oboe, and vox humana. Those pipes of the various registers that open into each channel are so constructed that while one shall give a fundamental note, the others shall give the chords of that note. An organ may have several wind-chests filled by the same bellows, and several key-boards, each key-board and wind-chest representing a distinct organ. In the largest instruments the number of these organs generally amounts to five. The most powerful of these is called the great organ; a smaller one the choir organ; another is called the swell organ, from the circumstance of its



Organ — Internal arrangements.

being enclosed in a wooden box with a front of louvre-boards, which can be worked by the player so as to give *diminuendo* and *crescendo* effects to the sound; a fourth is called the solo organ, being employed for special solo stops, such as the hautboy, the flute-stop, the vox humana, and others; lastly, there is the pedal organ, so called from its key-board being played by the feet. The key-boards for the hand are termed manuals, that for the feet the pedal. The most usual compass of the manuals is from CC (8 feet) to F in alt, four octaves and a half; that of the pedal from CCC to E or F, two and a quarter to two and a half octaves.

There are two kinds of organ pipes—flute pipes and reed pipes, of each of which there are several species. Flute pipes consist, first, of a foot, which is hollow, and receives the wind that sounds the pipe; second, of a body which is attached to the foot. Between the foot and the body of the pipe is a diaphragm or partition, having a small narrow aperture to let out the wind; over this aperture is the mouth, whose upper lip, being horizontal, cuts the wind as it escapes through the aperture and sets it in vibration, so causing the sound. The pipes are made either of pewter, of lead mixed with tin, or of wood. The metal pipes are generally cylindrical, open at their extremities, and clear in their sound. The wooden pipes are square

## ORGAN MOUNTAINS—ORGANO-METALLIC COMPOUNDS

and generally stopped at their extremities by a plug covered with leather, so as to be air-tight. The sound of these is softer. The longest pipes yield the gravest, the shortest, the most acute sounds. The pipes, however, which are stopped have only half the length of those that are open, for the same sound. The pipes vary in length from 32 feet or so, to the size of the pipe of a very small key. The reed pipes consist of a foot to carry the wind to the reed, a thin tongue of hard brass, one of the extremities of which is fitted into a kind of mold by a wooden plug, and the other is left free to vibrate; and in proportion to the length of that part of the tongue which is at liberty is the depth of the sound. After passing the reed the wind traverses a long pipe, whose dimensions and shape give character and quality to the sound.

The hand or barrel organs consist of a movable, turning cylinder, called a barrel, on which, by means of wires, pins, and staples, are set the tunes it is intended to perform. These pins and staples, by the revolution of the barrel, act upon the keys within, and give admission to the wind from the bellows to the pipes. The hand-organ is generally portable, and so contrived that the same action of the hand which turns the barrel gives motion to the bellows.

The invention of the organ is attributed to Ctesibius (q.v.) of Alexandria, about 200 B.C. An organ was presented by Emperor Copronymus to Pepin, king of France, about 755; and in 826 a water-organ was erected at Aix-la-Chapelle. The use of organs, however, was not common before the 14th century. At the beginning the instrument was very imperfect; it had only from 12 to 15 broad and large keys, which were struck with the fist and produced the tones of the diatonic scale. The keys in time became smaller, and between the diatonic tones the semi-tones were inserted. In 1444 H. Drossdorf of Mayence built a great organ with a pedal. According to others, Bernhard, a German, organist to the Doge of Venice, built the first organ with a pedal between the years 1470 and 1480. Improvements succeeded quickly in the 16th century; the division of all the pipes into different stops was now invented, and the tone of the instrument was adapted to the tone of the choir. The bellows were particularly improved, as till then 20 to 24 pairs had often existed in one organ, requiring from 10 to 12 men to tread them. But the present degree of perfection could not be obtained until Christian Forner had invented in the 17th century the wind-chest, by which an equal pressure of wind can be obtained in all the bellows. A hydraulic engine has been adapted, with success, to the purposes of working the bellows, and it is now pretty generally adopted. By an ingenious piece of self-acting mechanism, the pump works only when the wind-chest is empty, or only partially filled, ceasing when it is full. Mr. Barker, inventor of the pneumatic lever, patented in 1863 a contrivance for transferring some of the work from mechanism to electro-magnetism. An organ built on this principle is termed an electric organ. Several improvements have since been made on Barker's patent. The first electric organ constructed in Great Britain was used at Drury Lane in 1867, and many others have since been erected throughout the world.

The principal advantages of this description of organ are that it facilitates the playing, and enables the organist to sit at a key-board at a distance from the organ. One of the largest organs is that in Saint Peter's Church in Rome; it has 100 stops; that of the Seville Cathedral has also 100 stops and 5,300 pipes; one at Weingarten, in Swabia, 60 stops and 6,666 pipes; one at Haarlem, 60 stops and 5,000 pipes. The organs of Notre Dame and Saint Sulpice, in France, are likewise very large. The largest organ in England is that built in 1870 for the Royal Albert Hall, London. There are five rows of keys for the choir, great, swell, solo, and pedal organs; 138 stops, and nearly 10,000 pipes. The largest organ in existence is in Sydney, New South Wales.

There was but slight interest taken in organ construction in the United States until about the middle of the 19th century. The erection of the great organ in the Music Hall, Boston, by a German builder, Walcker of Würtemberg, gave the first impetus to public interest in the matter. Roosevelt of New York, and Jardine, likewise of New York, soon became two of the best-known organ-builders in America. Roosevelt invented "the automatic adjustable combination," which enables the player to place any required combination of stops under immediate control, and to alter such combinations as frequently as desired. By his construction of the wind-chest, also, each pipe has its own valve, actuated by compressed air. Among the largest organs in America are the organs of the Roman Catholic Cathedral, Montreal, the cathedral of the Holy Cross, Boston, which possesses 83 stops; the Music Hall, Cincinnati, with 96 stops and 4 manuals, and the Tremont Temple, Boston, with 65 stops. Consult: Dixon, 'Practical Organ Building' (1881); Hinton, 'Organ Construction' (1900).

**Organ Mountains, or Serra dos Orgãos,** Brazil. See ORGÃOS, SERRA DOS.

**Organ-Point, or Pedal-Point,** a musical term derived from the mediæval *organicus punctus*, and applied to the single tone, usually the tonic or dominant, held or maintained by one of the voice parts, while the other parts move freely, without reference to the sustained tone, except at the beginning and the end of the passage. In modern composition the organ-point is usually in the bass, hence the alternative term pedal-point, the organ pedal being best adapted to sustain the long note. When an organ-point occurs in any other part than the bass, it is said to be inverted, and if in the soprano is called the "holding-note," this term being also of mediæval conception and the origin of tenor from *tenere*, to hold, the voice by which the *organicus punctus* was generally sustained to an effective contrapuntal climax. In many modern compositions, especially pastorales, a double-organ or pedal-point on both tonic and dominant is frequently used.

**Organic Chemistry.** See CARBON COMPOUNDS.

**Organic Sensations.** See SENSATION, ORGANIC.

**Organo-Metallic Compounds,** in chemistry, compounds consisting of an organic radical in combination with a metallic base. The alkyl radicals—methyl, CH<sub>3</sub>; ethyl, C<sub>2</sub>H<sub>5</sub>; propyl,



## ORGANOTHERAPY

$\text{CaH}_2$ ; etc.—are the most familiar examples of organic bases which enter into combinations of this character; and zinc, lead, tin, and mercury are the most important metallic elements which combine with them. Zinc-ethyl,  $\text{Zn}(\text{C}_2\text{H}_5)_2$ , may be prepared by the action of metallic zinc upon ethyl iodide,  $\text{C}_2\text{H}_5\text{I}$ . A non-volatile, crystalline compound having the formula  $\text{C}_2\text{H}_5\text{ZnI}$  is formed at first, but under the influence of heat this decomposes into iodide of zinc and zinc-ethyl. As thus prepared, zinc-ethyl is a colorless liquid, which boils at  $244^\circ \text{F}$ . When exposed to the air it takes fire spontaneously, burning with a greenish flame. It may be converted, by slow oxidation, into ethylate of zinc,  $\text{Zn}(\text{OC}_2\text{H}_5)_2$ . Three compounds of ethyl and tin are known, and two compounds of ethyl and lead. Boron and silicon form compounds with ethyl, and these, although they contain no metal, are also called "organo-metallic" bodies. Silicon-ethyl has the formula  $(\text{C}_2\text{H}_5)_2\text{Si}$ , and may be prepared by treating zinc-ethyl with silicon tetrachloride. It is a colorless liquid, boiling at  $302^\circ \text{F}$ . Several of its derivatives have a considerable theoretic interest, among these being a substance which has the formula  $\text{SiC}_2\text{H}_5\text{O}$ , smells like camphor, and behaves, chemically, like an alcohol. Sodium-ethyl has not been isolated in the pure state, but a double compound of this substance and of zinc ethyl has been prepared, having the formula  $\text{NaC}_2\text{H}_5 + \text{Zn}(\text{C}_2\text{H}_5)_2$ .

**Organotherapy**, the medical use of animal organs or glands, or of their extracts. The use of the extracts of many of the viscera of lower animals for their remedial effects in illness is of great antiquity. The savage who ate the heart of his courageous enemy had an inkling of a truth, even if the results were obtained only by suggestion. Ancient Chinese, Indian, Greek, and Roman medicine dealt largely with the fancied effects of eating certain organs, but it has only been within the era of exact physiological chemical methods that physicians have been in a position to apply the principles of organotherapy along rational and individual lines. As Paracelsus was the first to show that it was not the entire drug that was valuable, but that each drug contained some active principle to the action of which its effects were due, and thus was the forerunner of the distinctly modern school of "active principles," so Brown-Séquard, who maintained (1869) that each organ of the body had an internal secretion which was an active agent, was the founder of the modern school of organotherapy. The full applications of these general truths are far from being in sight, especially when one considers the recent developments of knowledge concerning specific cytotoxins, cytolytins, etc. Claude Bernard may be said to have antedated Brown-Séquard when he discovered the glycogenic function of the liver; but Brown-Séquard, with more brilliancy and fancy than fact, made the broad application that all the glands of the body—liver, spleen, suprarenals, kidneys, testes, thyroids, ovaries, etc.—possessed internal secretions which passed into the blood and lymph and thus contributed to the metabolism of the body. Subsequent study has not borne out his theory, but it is known that certain glands and organs of the body do contain substances which are found only in those particular glands and organs, and which, extracted from the corresponding glands in the

lamb, sheep, pig, cow, etc., and used hypodermatically, or by the mouth, have marked physiological actions and may be employed in therapeutics. Many of the extracts first devised by Brown-Séquard are now known to be worthless, particularly the extracts from the testicles of the ox and ram, which were to invigorate the old, and extracts of the brain, of the ovaries, and of the mammary glands. All of these contain well-known compounds which are present in most of the tissues of the body, and beyond possessing certain tonic properties, such as a good beef-tea would possess, their action is nil. Later study has shown, however, which of the organs contain practicable therapeutic principles, and further research will undoubtedly reveal others, and may discover some in the organs now rejected as containing nothing specific. The most important of these substances now used in medicine are derived from the liver, the stomach, pancreas, thyroids, thymus, suprarenals, and sexual organs of the more common domestic animals. Of these the digestive ferments pepsin and pancreatin, iodothylin from the thyroid, epinephrin from the suprarenals, and spermin from the testicles are the most important. The action of the digestive ferments is discussed under digestion (q.v.).

The peculiar symptoms that resulted from the taking out of the thyroid gland in men and animals drew attention to this organ and its effects on secretion. The close resemblances of certain diseased persons to man and animals deprived of this gland was noted, and it was soon established that myxœdema and cretinism (q.v.), two hitherto intractable diseases, were really due to diseases of the thyroid function. It was but a step, after finding the cause, to apply the remedy, thyroid extract, and these two previously hopelessly incurable diseases became amenable to treatment. At first fresh glands were used; later, extracts; still later, the active principle, called by a variety of names iodothylin, thyroiodin, thyroglobulin, etc. Thyroid extract causes, in addition to its effects in metabolism, a fall of blood-pressure through dilatation of the blood-vessels, and a slight depressing action on the heart in large doses. It also increases the nervous irritability of the heart-muscle by reason of its action on the vagus nerve. Small doses of the drug administered during a considerable period of time cause symptoms comparable to exophthalmic goitre (q.v.). The diseases for which it is used are: Cachexia strumipriva, following surgical removal of the thyroids; goitre of the hyperplastic follicular variety, a form which is associated with diminished formation of thyroid substance; myxœdema, sporadic cretinism; certain obscure skin-diseases, and obesity. It is also used as a general metabolic stimulant. Within a few years an extremely active and powerful substance has been discovered in the suprarenal glands. It has received various names, myxœdema, suprarenin, adrenalin, etc., all of which are closely allied products that represent as nearly as possible the active principle or principles of this gland. This substance in the human body is probably of great importance in maintaining the tension of the blood-vessels, and it also bears some relation to the sugar-oxidizing properties of the liver or pancreas, or both. The effects of adrenalin, used hypodermatically, are immediate. It causes

marked rise in the blood-pressure, due to its stimulating the mechanism that constricts the blood-vessels; it slows the heart and causes it to beat more strongly; it depresses the breathing centres somewhat, dilates the pupils, and slows down the peristaltic movements of the intestine. In medicine it is extremely useful as a local application to constrict blood-vessels, lessening hemorrhage, reducing inflammation, stopping discharges of the mucous membranes. It is thus particularly valuable in sore throat, running from the nose, inflammation of the eye, hemorrhage from the nose, or from the stomach. It has a certain value in some forms of diabetes, especially in bronzed diabetes, in rachitis, in spasmodic asthma, and in the treatment of shock of any description, particularly if associated with loss of blood-pressure. The use of the active principle of the suprarenals is only just begun.

In the sexual glands substances rich in nucleins and phosphorus are present. Many of these have received names, but few have been isolated in sufficiently pure form to be useful in therapeutics. Those that are now (1904) available stimulate metabolism, and some are of value for counteracting the undesirable effects of the removal of some one of the organs of generation, as in castration or in ovariectomy.

SMITH ELY JELLIFFE, M.D.,

Editor *'Journal of Nervous and Mental Disease.'*

**Or'ganzine.** See **SILK.**

**Orgãos, Serra dos,** sār'rā dōsh ōr-gownsh', or **Organ Mountains,** Brazil, a portion of the Serra do Mar cordillera, 40 miles northeast of the city of Rio de Janeiro, so called from their resemblance to the pipes of a church organ, as viewed from the sea. The highest peak is 3,800 feet.

**Orgaz, ōr'gās,** Francisco, Cuban poet: b. Havana, Cuba, 1815; d. Madrid, Spain, 1873. He was educated in Havana, entered journalism and in 1839 went to Madrid where he took up his residence. His first volume of poetry, 'Pre-ludios del Arpa' (1841), won for him recognition as one of the best lyrical poets of Spanish-America; he also wrote two dramas and several historical works besides a second volume of verse 'Las Tropicales' (1850).

**Orgeat,** a flavoring substance much used in medicinal and other drinks. It is essentially a syrup of sweet and bitter almonds, and possesses a rich almond flavor, but it is often modified by the use of other ingredients

**Orgetorix, ōr-jēt'ō-rīks,** Helvetic chief: d. about 62 B.C. He was a man of vast wealth and power and intrigued to gain sovereign power, endeavoring to persuade the Helvetii to emigrate to Gaul. His designs were suspected and he was brought to trial, but died, supposedly by his own hand, before a decision was rendered. Consult Caesar's 'Commentaries,' book I.

**Orghyeff,** Russia, district town in the province of Bessarabia. It is situated about 30 miles north of Kishineff railway station. The ruins of an old Dacian fortress, Petrodava or Orhei, are near the town. It was annexed to Russia in 1812. Pop. 13,356.

**Orgies, ōr'jīs, or Orgia.** See **BACCHUS.**

**Orguineth, ōr-gī-nēt.** See **MUSICAL INSTRUMENTS, MECHANICAL.**

**Oria, Italy,** a town in the province of Lecce, and the district of Brindisi, on the Brindisi-Taranto Railway, 22 miles west-south-west of Brindisi. The town is built on a hill between two small lakes; it is the see of a bishop and has a cathedral, a mediæval town-house, a library, hospital, and gymnasium. It carries on a trade in wine and oil. Oria was the ancient Greek settlement Uria or Hyria. Pop. 7,100.

**Oriana (1).** The mistress of Amadis de Gaul, the legendary hero of mediæval chivalry. According to romance she was the daughter of Lisuarte, the English monarch. Queen Elizabeth was often styled "The peerless Oriana" in the complimentary poems of her day. (2) The chief personage in Fletcher's comedy, 'The Wild Goose Chase' (1621), and in Farquhar's comedy 'The Inconstant' (1702). (3) A character in Beaumont and Fletcher's play, 'The Woman Hater' (1607). (4) The title of a poem by Tennyson in which the name is introduced as a constant refrain (1830).

**Oriana, The Triumphs of,** the title of a book of madrigals composed in honor of Queen Elizabeth, which Thomas Morley compiled and printed in 1601.

**Oriani, ō-rē-ā'nē, Barnaba,** Italian astronomer: b. Garegnano, Italy, 1752; d. 1832. He studied astronomy under Lagrange, assisted Reggio and De Cesaris in measuring the arc of the meridian and his calculations proved Ceres, which Piazzi discovered in 1801, to be a planet, not a comet as Piazzi had supposed. He was director assistant in Brera Observatory at Milan in 1802, and was editor of the 'Effemerid Astronomiche' in 1778-1830. He was created a count by Napoleon and published: 'Tables of Uranus' (1785); 'Spherical Trigonometry' (1806); etc.

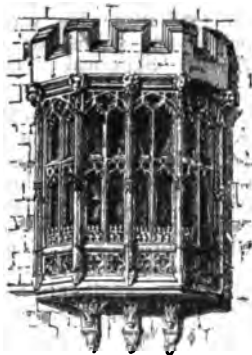
**Oribasius, ōr-I-bā'shī-ūs,** Greek physician to the emperor Julian: b. Pergamon (or Sardis) about 325 A.D.; d. about 400. He studied in Cyprus under Zeno, became attached to Julian during the Oriental exile of the latter, accompanied him to Gaul, and, after his accession in 361, was appointed quæstor of Constantinople. But after Julian's death, when the Christians again obtained the upper hand, he was banished among the Danubian barbarians. He was recalled during his last years. Oribasius is reputed the discoverer of the salivary glands. Under Julian's direction he summarized the medical lore of the day. A Latin version of the 6th century has been edited by Bussemaker, Daremberg, and Molinier.

**Oribe, ō-rē'bā, Manuel,** Uruguayan soldier and politician: b. Montevideo, Uruguay, about 1802; d. there November 1857. When but a boy he entered the patriot army, where through his ability he won high rank; he was minister of war under José F. Rivera in 1833-5, succeeding him in the presidency in the latter year. Rivera raised a revolt against him in 1837 and finally succeeded in defeating and forcing him to leave the country. Oribe gained

the support of the dictator Rosas, at Buenos Ayres, and in 1842 began the Nine Years' war, intending a foreign subjugation of Uruguay. The intervention of France and Brazil prevented the success of his scheme, and his plan to seize the presidency in 1855 was rendered futile by the foreign powers.

**Oriel College**, Oxford, England, founded in 1326 by Edward II. on the suggestion of Adam de Brome, his almoner, for a provost and ten fellows, and first named the College of Saint Mary, its present title being probably derived from La Oriole, the name of the house presented by Edward III., into which they moved two years later. The buildings of Oriel College are among the finest in Oxford. The college now consists of a provost, 12 fellows, and has 10 scholarships, tenable for 5 years, and 4 exhibitions tenable till the end of the twentieth term from matriculation. The value of each of these scholarships and exhibitions (during residence) is £80 per annum. Candidates for these exhibitions must be deserving persons in need of support at the university. No one is eligible to a scholarship who has attained the age of 20 years, or who, being a member of the university, has exceeded two years from his matriculation. The college has presentations to 15 livings. Among its distinguished alumni are Matthew Arnold, Barclay, Butler, Clough, Hampden, Thomas Hughes, Langland, Prynn, Sir Walter Raleigh, Cecil Rhodes, Wilberforce, etc., and several leaders of the Tractarian movement, Arnold, Keble, Newman, Pusey, and Whately.

**Oriel Window**, a bay window of an upper story supported by brackets or corbels. In some cases the support is derived from a pier or engaged column carried from the ground



Oriel Window, Balliol College, Oxford.

with the upper part corbeled out to meet the floor of the projecting window. Formerly no distinction was made between this and a bay window which rose from the ground.

**Orient, Joseph**, Austrian painter: b. Burbach, Westphalia, 1677; d. Vienna 1737. He studied painting under Faistenberger, and was appointed vice-director of the imperial collection of pictures at Vienna. He painted a large number of landscapes, which were much appreciated in his time, partly on account of a really effective rendering of nature, and partly on account of an unusually brilliant and refined coloring. Several

of his pictures were engraved by Leichsenring and Rosel and became very popular.

**Orien'tal Region**, one of the primary divisions of the earth considered with reference to its fauna; a zoogeographical province. It embraces the whole of southeastern Asia south of the Himalayan watershed, from Beluchistan to the Philippines and including all the Malayan archipelago as far as Celebes. It is separated from the Australian region by "Wallace's Line." See ZOOGEOGRAPHY.

**Oriental Research**, the investigation and interpretation of literary remains in the East.

**Egypt**.—Modern Oriental research commences with the expedition of Napoleon Bonaparte to Egypt in the summer of 1798. This expedition was accompanied by scientists and artists, who published the results of their observations in a great work entitled 'Description de l'Égypte' (1809-13). The antiquities collected by that expedition became the property of the conquering British and formed the foundation of the Egyptian collections in the British Museum. Among these was the famous Rosetta stone. This was a slab of black granite containing a portion of a decree in honor of Ptolemy V. Epiphanes, 205-181 B.C., written in the ancient Egyptian hieroglyphics, the more modern Egyptian demotic script and in Greek. By means of this trilingual inscription the hieroglyphic characters were deciphered by Young in England and Champollion in France, almost at the same time—1821-2, and finally, at a later date, the demotic script was also deciphered. This inscription, therefore, became the key to the interpretation of all Egyptian literature and civilization. The decipherment of the Rosetta stone led to a desire to obtain more inscriptions, and in 1828 a Franco-Italian expedition was sent out, headed by Champollion and Rosellini, to examine the most important ruins of Egypt and copy pictures and inscriptions. The published results of this expedition remain to this day a store-house of material for Egyptologists. In 1840 the Prussian government sent out a similar expedition under Lepsius. Taking advantage of the work already done, Lepsius was able to arrange the monuments discovered in historical order, and to place the study of Egyptian art and civilization on a permanent and scientific basis. This expedition was particularly interested in the question of the relation of Egypt to Bible story, so that in addition to the exploration of Egypt and Ethiopia, the peninsula of Sinai was visited, its ancient copper mines and Egyptian inscriptions dating back to the time of the old empire discovered, and an effort made to trace the route of the Exodus.

The period of extensive excavations commenced in 1850, with the mission of a French scholar, Augustus Mariette. The first and greatest of his discoveries was the Serapeum, or tombs of the sacred Apis bulls at Memphis, 64 in all. The erection of these tombs extended through the period from 1300 to 50 B.C. Here were found also thousands of memorial stones erected by pious pilgrims, amulets, funeral figures and so forth. In 1857 the Khedive established a museum at Cairo, appointed Mariette director, and gave him authority to conduct excavations where he would in Egyptian terri-

tory. From this time until his death, in 1880, Mariette exercised the exclusive privilege of excavation in Egypt. His explorations were enormous in extent, including all the well known ruins, and more of the great discoveries of Egyptology were made by him than by any other one man. No systematic report of his excavations as such has ever been published. He was concerned principally in the discovery and recovery of antiquities, a method of excavation which inevitably results in the destruction of a great amount of material archæologically valuable, and his publications concern themselves with the antiquities discovered, not with the method of their discovery. Since his death the direction of antiquities in Egypt has remained in the hands of the French. A careful system of protection and preservation of antiquities and ruins has been introduced, a large new museum constructed (1902), and excavations systematically conducted at numerous sites on behalf of the Egyptian museum.

Reversing the policy of Mariette, permission was given by his successor, G. Maspero (now serving a second time as director of antiquities), to representatives of other nations and to private persons to conduct excavations under reasonable restrictions and to acquire and export antiquities. Taking advantage of this change of policy, the Egypt Exploration Fund was organized in 1883, and has been supported from that day to the present day by funds collected in almost equal parts in England and America, although the direction has been entirely in the hands of the English contributors. The first work of this Fund was done in the Delta, in the excavation of the biblical store-city of Pithom and the Greek city of Naukratis. Since 1891 these excavations have been conducted in upper Egypt. The most famous name connected with the excavations of the Egypt Exploration Fund is that of W. Flinders Petrie. Working at times for the Fund (regularly since 1896) and at times on account of private persons, Petrie has achieved astonishing results, and claims to have carried back Egyptian history to an almost incredibly early period. Certainly he has proved that Menes, the supposed mythical founder of the first Egyptian dynasty, was a real person, by discovering inscriptions of his reign, and he and others have found remains of a civilization long antedating even this period of Menes. To give young Egyptologists a chance to excavate on their own account, Petrie organized in 1896 the Egyptian Research Account.

The last decade has been one of especial activity in Egyptian exploration, and, even in comparison with the great discoveries of Mariette's time, fertile in results. In those years independent expeditions have been conducted by Swiss, Germans and Americans, among whom may be mentioned Mrs. Hearst; while since 1899 the German "Orient Gesellschaft," organized somewhat after the method of the Egyptian Exploration Fund, but covering a larger field, namely, the whole Orient, has conducted systematic excavations at various points.

The objects found in excavations in Egypt are almost incredibly numerous. Besides the magnificent collections in the museum at Cairo, there are important collections of Egyptian

antiquities in the British Museum, the Louvre, the Berlin Museum, Turin (here is the famous Papyrus Prisse), and smaller collections in various museums in the United States and elsewhere. Besides the monuments and papyri belonging to those periods which we commonly call Egyptian, written in Egyptian characters, there have been found, especially in the last decade, mainly in the Fayum, large numbers of papyrus fragments, containing parts of Greek manuscripts, some like Aristotle's 'Constitution of Athens' and the poems of Bachyllides; others, like the Logia of Jesus, various heretical gospels, apocalypses and the like, of theological value. Great quantities of letters, deeds and documents of various descriptions, written on fragments of papyrus, potsherds and the like, have also revealed with photographic minuteness the every-day life of the people of the Fayum district in the centuries immediately preceding our era. Of late also renewed attention has been paid by explorers to the Christian (Coptic) and Moslem remains with which Egypt abounds, but which earlier generations of explorers and scholars had overlooked.

*Assyria and Babylonia.*—Assyrio-Babylonian research may be said to begin with the tentative excavations of Rich at Babylon in 1811. Others before that date had identified the ruin mounds of Babylon and Nineveh, and copies of Babylonian and Persian cuneiform inscriptions had already made their way to Europe, but Rich made the first serious survey of the mounds of Babylon. In 1820 he made a similar exploration in the ruined mounds of Nineveh and Calah. The inscriptions secured by him at these sites formed a nucleus for the later great Assyrian and Babylonian collections in the British Museum.

More than 20 years elapsed after Rich's death before any systematic excavations were undertaken. Then through the influence partly of Julius Mohl, one of the secretaries of the Société Asiatique, who had seen in London the inscribed material gathered by Rich in Assyria and Babylonia, the French government was induced to create, for purposes of investigation, a vice-consulate at Mosul, nearly opposite Nineveh, and Paul Emil Botta was sent out to fill this position. After some rather unsuccessful excavations at Kuyunjik, on the site of ancient Nineveh, Botta was led by the reports of the natives to undertake excavations at Khorsabad, 20 miles to the northeast. Excavations were conducted at this site by Botta from March of 1843 to October of 1844, and by his successor, Victor Place, from 1851 to 1855, at the expense of the French government, which also published the results in monumental form. These results were the systematic and scientific excavation of a palace of Sargon, king of Assyria, 721-705 B.C., which was adorned with a large number of magnificent bas-reliefs and other works of art. The French expedition also discovered a considerable number of inscriptions in the cuneiform script on stone and clay.

Shortly after Botta commenced his work of excavation, Austen Henry Layard visited Mosul on his return from Persia to Constantinople. His enthusiastic report secured for him a small sum of money from Lord Stratford de Redcliffe, the British ambassador, with which he returned to Mosul in the autumn of 1845 and commenced excavations on a very small scale at the mounds

of Nimroud, on the banks of the Tigris, a few miles below Mosul, the remains of the one time Assyrian capital city of Calah. With very limited resources but with remarkable success in the discovery of sculptures, bas-reliefs, inscriptions and the like, Layard continued to excavate at Nimroud, Kalah Shergat, the most ancient capital of Assyria, still further to the southward, and at Kuyunjik (Nineveh), until midsummer 1847. In 1849 he was again sent out to Assyria and for almost three years conducted excavations for the British Museum at the sites already mentioned, making one brief and unsatisfactory expedition to Babylonia. The wonderful success which Layard achieved in monumental results, and possibly still more the remarkable ability with which he presented these results in graphic form, connecting them also with the Bible story, aroused an interest which has continued to the present day, and which will forever make the name of Layard illustrious in connection with Assyrian exploration.

In 1851, while Place was excavating at Khor-sabad, an admirably equipped expedition, sent out by the French government under the direction of M. Fulgence Fresnel, was exploring Babylonia and conducting tentative excavations at various sites in that region. The material results of this expedition were, unfortunately, lost by the over-turning of a raft on the River Tigris. At the same time the attention of the English was called to Babylonia by the work of Loftus, who, sent out as an attaché of the Turco-Persian Frontier Commission, took occasion to explore Babylonia and conduct some small excavations at Warka (Erech). The Assyrian Excavation Fund was organized in 1852, and under the general direction of Sir Henry Rawlinson, excavations were carried on by Loftus, Taylor and Rawlinson himself at various sites in Babylonia, including Erech, Ur, Eridu, Larsa and Borsippa, the sister city of Babylon, and by Hormuzd Rassam at Nineveh. None of these explorers undertook the scientific excavation of sites, but rather sought to recover inscribed material, which, in the form of clay tablets and cylinders, they found in large quantities, especially Rassam, who, without knowing it, excavated a large part of the library of the Assyrian king, Ashurbanipal (668-626).

From 1855 to 1872 there was a long period of inactivity, so far as excavations were concerned, the attention of scholars being directed to the study of the numerous inscriptions which had been brought back to England and France, the key to the decipherment of which had just been discovered. As in the case of the Egyptian inscriptions, so here, it was a trilingual inscription which furnished the clue to the decipherment. As early as the commencement of the 19th century various scholars had essayed to read the cuneiform inscriptions brought back from Persepolis and elsewhere, and different scholars succeeded at various times in deciphering a few characters, but not in reading an inscription. On the face of a cliff, in a huge space especially prepared for the purpose, its lowest part some 300 feet above the ground, in the mountain pass at Behistun in Persia, Darius, so tradition said, had caused a long inscription to be engraved. Of this inscription Sir Henry Rawlinson on various occasions, between the years 1835 and 1839, at considerable

expense and much risk of life and limb, succeeded in obtaining complete copies. In what languages the inscription was written was unknown, but Rawlinson assumed that the first column was Persian, similar to the language of the Avesta. It was not until 1846 that he was able to complete and publish the decipherment of this first column, the Persian cuneiform text. The Persian cuneiform proved to be syllabic, an adaptation vastly simplified from the complex Semitic Babylonian of the third column. This third column, the most important text for students of Assyriology, Rawlinson did not succeed in deciphering for five more weary years (1851). The second column, the Median or Susian text, was not satisfactorily deciphered until 1890. The decipherment of these inscriptions was naturally an epoch-making event, and for this as well as for the great service which he rendered in publication (he was the general editor of the *Cuneiform Inscriptions of Western Asia*, published by the British Museum), Rawlinson's name stands deservedly at the head of the honor list of Assyriology.

In 1872 George Smith, then an employee in the British Museum, discovered among the fragments of clay tablets brought by Rassam from Nineveh, an Assyrio-Babylonian flood legend, strikingly similar in many respects to the flood story of the Hebrew scriptures. The publication of this story aroused such interest that the *Daily Telegraph* of London at once put at the disposal of the British Museum a thousand guineas to send Smith to Kuyunjik to search for more fragments. This expedition opened a new era of excavation. In the following year Smith was again sent to Kuyunjik by the British Museum. In 1875 he was sent out for the third time, but died, without accomplishing anything, in 1876. He was a most acute student of the cuneiform texts, but no explorer. Rassam then consented to take up once more the work of excavation for the British Museum. Besides excavating at Nineveh and Calah, he explored in this campaign (1877-82) the hitherto unknown Assyrian site of Balawat, where he found the great bronze doors with the inscriptions and reliefs of Shalmaneser II., 859-826 B.C. He also conducted excavations at a number of Babylonian sites, Borsippa, Cutha, Sippara and others, from which he secured an almost incredible number of inscribed clay tablets. His work was conducted, like that of English explorers in general, for the purpose of obtaining inscriptions, with no attempt at a complete and scientific excavation of the sites explored.

At the same time that Rassam resumed his work of excavation, DeSarzec was appointed French consul at Bassorah in southern Babylonia. Led by reports of the natives, he commenced excavations at some ruin mounds in that region, known as Telloh, where he found a quantity of statues dating from the third millennium B.C., executed with remarkable skill in hard diorite and covered for the most part by inscriptions in cuneiform characters, the first monuments of art discovered on the soil of Babylonia. These monuments were purchased at once by the French government for the Louvre Museum, and DeSarzec commenced a systematic exploration of Telloh (Sirpur-la), which was conducted at intervals until the time

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of his death, in 1903. The result of these excavations was the discovery of an enormous quantity of inscribed clay tablets belonging to a most remote period, as well as statues, inscribed bronze and silver figures, vases and other objects, showing a remarkable development of art in that region at an extremely early period.

American interest in Babylonian exploration dates from the year 1884, when an expedition headed by Dr. William Hayes Ward, called the Wolfe Expedition, from the fact that the funds were provided by the liberality of Miss Catherine Lorillard Wolfe, of New York, was sent out under the auspices of the Archaeological Institute of America, to examine ruin sites in ancient Babylonia and report on the prospects, scientific and practical, of excavations in that region. In 1887 a somewhat similar German expedition was sent out, which conducted tentative excavations in two burial mounds, Hibba and Surghul, in southern Babylonia. Both of these expeditions reported favorably on Nuffar, the site of the ancient Nippur, as a place for excavation. In 1888 the Babylonian Exploration Fund was organized in Philadelphia and an expedition was sent out under the auspices of the University of Pennsylvania, with the present writer as director. The site selected for excavation was Nippur. The systematic exploration of this site has been continued, with intermissions down to the present time, under Peters, Haynes and Hilprecht, the last period of actual excavation ceasing in 1900. The main work of the excavation at Nippur has been directed toward the great Temple of Bel, the chief religious centre of that region from a period long antedating 4000 B.C. Some 40,000 or more inscriptions, clay tablets and fragments of clay tablets, stone monuments and the like have thus been recovered, and our knowledge of the history and civilization of Babylonia carried back 2,000 years or more.

The success of the Americans in securing remains of such great antiquity aroused new interest both in England and Germany. In 1897 a new expedition of investigation was sent out by the Germans, and in 1899 the German "Orient Gesellschaft" was organized, and excavations commenced at Babylon under the direction of Dr. Koldewey. From that time until the present the work of systematic excavation has continued at that site, while supplemental excavations have been undertaken at various ruin mounds in Babylonia and Assyria. The interest aroused in America led to the organization in 1900 of the Ur Expedition, through the energy and enthusiasm of Dr. E. J. Banks, and permission was applied for to excavate at Mugheir, the ancient Ur of the Chaldees. For three years this permission was held up by the Turkish government, although during that period similar permission to excavate at various Babylonian sites was freely granted to the Germans. At last in 1903 the Ur Expedition was disbanded. Just at that moment the despatch of American ships to Beirut led unexpectedly to the issuance of the firman which had been so long delayed. Simultaneously a new organization was formed, called the "Oriental Exploration Fund of the University of Chicago," which accepted the firman issued on behalf of the Ur Expedition, and in the

autumn of 1903 excavations were commenced by the new American expedition at Bismaya, the site of an ancient Babylonian city, supposed to be Isin, not far from the ancient Nippur, under the direction of Dr. Edgar J. Banks. In that same year also the English resumed the work of excavation at Nineveh, so that at the present writing four nations are concerned in the excavations in Babylonia and Assyria. The principal collections of Babylonian-Assyrian antiquities are to be found at London, Paris, Constantinople, Philadelphia and Berlin.

*Persia.*—Research in Persia is closely connected with research in Babylonia, and it was through the decipherment of the cuneiform inscriptions found in Persia that the key to the decipherment of the Babylonian inscriptions was discovered. Rich visited and described Persepolis as well as Babylon and Nineveh, and other early explorers copied inscriptions there and elsewhere in Persia; but no excavations were conducted until 1851. These first excavations, conducted by the English explorer, Loftus, and Col. Williams, head of the Turco-Persian Frontier Commission, were, however, of very small extent. Thirty years later M. and Mme. Dieulefoy conducted excavations of a more extensive character at the same place, enriching the Louvre museum in Paris with very many beautiful colored tiles, and published an account of their discoveries in their 'L'Acropole de Susa' (1890); but even these excavations were very superficial.

In 1895 the French government concluded a treaty with Persia, by which it received exclusive rights of excavation, and in 1897 M. J. de Morgan, at that time director of antiquities in Egypt, was appointed director of excavations in Persia. Since that date systematic and expensive excavations have been conducted at Susa by M. de Morgan and his associates for the French government, and the results have been published with remarkable promptitude and in admirable form for the student. The explorers have been remarkably successful in discovering a large amount of inscribed material showing that the early civilization of Elam in the third millennium B.C. was practically identical with that of Babylonia, from which it was derived. The most important discovery made in the excavations up to this time, and one of the most important in the annals of Oriental research, was the discovery in the winter of 1901-2 of a large stela, carried off by the Elamites from Babylonia, containing the code of laws of Hammurabi, king of Babylon, about 2250 B.C., the earliest code of laws by much more than 1,000 years, discovered anywhere up to this time, and one which profoundly influenced the legislation and civilization of all western Asia.

*Palestine.*—While the keenest interest in Egyptian and Babylonian excavations was aroused by their relation to the Bible, exploration in Palestine, the Bible land proper, commenced at a much later date and has been prosecuted with less energy than the similar work in those regions. The first important work was done by an American, Rev. Dr. Edward Robinson of New York. In 1838 (and again in 1852), accompanied by Eli Smith, an American missionary in Beirut, he explored the Holy Land, identifying for the first time on



rational grounds the greater part of the ancient sites of the country, a work of historical topography. The second move in the exploration was also made by America, the United States government sending out an expedition in 1847 under Lieutenant Lynch of the Navy, to explore the Jordan and the Dead Sea.

It was not, however, until 1865 that an organized effort was made to undertake a scientific and complete examination of the country. In that year the Palestine Exploration Fund was organized in England, and undertook to explore and map Palestine west of the Jordan, and shortly after a similar organization was formed in America to explore Palestine east of the Jordan. The American society accomplished very little and soon passed out of existence. The English society, which continues in existence to the present time, conducted a thorough survey of the west Jordan territory and made an accurate map of the country, and has published a monumental series of memoirs dealing with the climate, the fauna, the flora, the antiquities, etc., of the territory surveyed, and latterly also the excavations accomplished.

Excavations were conducted by the Fund at Jerusalem, from 1867 to 1870, under the direction of Sir Charles Warren, which were valuable in determining the topography of the temple area, although almost nothing was found in the way of antiquities. For the next 20 years no further excavations of importance were conducted. The Fund confined its explorations to the survey and to antiquities on the surface of the ground, every foot of which was minutely explored. The survey of western Palestine was completed in 1878, and in 1881 a similar work was undertaken in Palestine, east of the Jordan; but after about 500 square miles in Moab had been surveyed, the Turkish authorities put a stop to this work. In 1878 a German Palestine society was organized on the same plan and with the same objects as the English Exploration Fund. In the employ of this society Dr. Schumacher, of Haifa, an American citizen, has, since 1884, surveyed and mapped the greater part of the east Jordan region; and it may now be said that, so far as the surface is concerned, Palestine has been more thoroughly explored than any Oriental country. So far, however, it has proved singularly lacking in important monuments and inscriptions, and such as have been found have been found by the natives or by accident. These are first the inscription of Mesha, a king of Moab in the 9th century B.C., found by a German missionary, Klein, at Dibon, in 1868, and later largely destroyed by the Arabs; secondly, a Hebrew inscription, possibly of the time of King Hezekiah, found in the Siloam tunnel, beneath the hill of Ophel, and dealing with the construction of that tunnel; and thirdly, a Greek barrier inscription from the temple of Herod, found by Clermont Ganneau in use as a tombstone in an old graveyard in Jerusalem. More important than any of these inscriptions found in Palestine itself, was the discovery in 1887 by natives, at Tel el-Amarna in Egypt, of about 300 clay tablets written in the Babylonian cuneiform script, from kings, petty princes and Egyptian representatives in Palestine, northern Syria, Mesopotamia and Babylonia to the Egyptian over-lord, about 1400 B.C. The discovery of these inscriptions made it

plain that at that date, antedating the Hebrew conquest, Palestine possessed a civilization largely identical with that of Babylonia, and that writing on clay tablets was practised in that region.

This discovery led to the belief that excavations in Palestinian sites would result in the discovery there of similar inscriptions on clay, and probably also of stone inscriptions like the Mesha monument and the Siloam inscription from the Hebrew period. On behalf of the Palestine Exploration Fund, Petrie, the Egyptian explorer, made a reconnaissance in 1889, and conducted tentative excavations at the mound of Tel el-Hesi, the ancient Lachish, in the extreme southwestern part of Judaea, on the borders of the Philistine plain. In the following year the Palestine Exploration Fund entered upon a systematic campaign of excavation under the direction of Dr. F. J. Bliss of Beirut, an American. Excavations were conducted at Lachish, 1890-3, at Jerusalem, 1894-7, where the southern wall of the city was excavated and traced, and from 1898 to 1900 at various sites in the Shephelah, the foot-hills between Judaea and Philistia, including Tel es-Safi, the ancient Gath, and Tel Sandahannah, the ancient Marissa. At the last named place a Seleucidian city was thoroughly explored. Later, the natives unearthed the necropolis of this city, and in 1902, Dr. Thiersch of Munich and the present writer had the good fortune to discover, in that necropolis, elaborately decorated tombs containing Greek inscriptions, belonging to a Sidonian colony settled at Marissa in the Seleucidian period, the only discovery of this sort yet made on Palestinian soil. In 1902, under the direction of Mr. R. A. S. Macalister, formerly Dr. Bliss' lieutenant, excavations were commenced at the site of the ancient Gezer, which are still in progress. The results of the excavations up to date have been, on the whole, disappointing. They have given us a general insight into the history of the civilization of the country from the prehistoric period onward, but almost no inscribed material has been found and very little which bears directly upon Biblical story. At Gezer the excavators have unearthed a pre-Israelitic, open-air temple or place of worship, consisting of huge stones set up in alignment. At Lachish one inscribed clay tablet was found of the same period as those from Tel el-Amarna; and at Ta'amach, on the plain of Megiddo, four more clay tablets of the same period were discovered by Dr. Sellin of Vienna in the course of excavations conducted by him in 1902.

Following the example of the Palestine Exploration Fund, in 1903 the German Palestine Society, in conjunction with the Orient Gesellschaft also commenced a campaign of excavation. The site selected for the first work, which is now in progress, was Muteselim and the neighboring Lejjun, presumably the site of the ancient Megiddo of the Canaanite and Hebrew, and Legio of the Roman periods, on the southern edge of the plain of Esdraelon.

In 1900, through the efforts of the late Prof. Thayer of Harvard, an American Oriental School, similar to the school of archaeology at Rome and Athens, was established at Jerusalem, to give American students an opportunity for study and research in the Holy Land itself, and to secure continuous and systematic inves-

tigation, and in 1903 a similar German institution was also established at Jerusalem.

Outside of Palestine, excavations were conducted at various points on the Phœnician coast in 1860 and 1861 by a French expedition under the direction of Renan, without important results. In 1888 native stonecutters at Sidon discovered the so-called Alexander sarcophagi, which, with the sarcophagus of a Sidonian king, Tabnith, were excavated by Hamdy Bey and carried to Constantinople. These Sidon sarcophagi rank among the art treasures of the world. In 1901-2 a Phœnician temple was excavated at Sidon for the Turkish government by Macridi Bey. Through the interest in Oriental archaeology aroused in the German emperor by his visit to the East, a German expedition was sent out in 1901 to explore and restore the ruins of the temples at Baalbek. At the same time the Sultan presented to the Kaiser the small but remarkable ruins at Mesheyttā in Moab, and in 1903, under the direction of Dr. Schumacher, these were removed bodily to Berlin to adorn the New Friedrich Museum.

In northern Syria, which abounds in ruin sites, almost no excavations have been conducted as yet. Some very superficial work was done at Carchemish (Jerabis), the ancient Hittite capital on the Euphrates, by the English about 30 years ago, and in 1887 the Germans conducted systematic excavations at the small mound of Sinjirli, northward of Aleppo, which resulted in the discovery of Aramæan and Hittite inscriptions and sculptures, in the 8th and 9th centuries B.C.; but for practical purposes this region is still virgin to the excavator. The surface antiquities of northern Syria southward to the Hauran were explored, inscriptions collected and the like about 40 years ago by two French scholars, de Vogüé and Waddington, and various scholars have visited and described the Palmyrene region. The latest and most complete work in the surface exploration of Syria is that done by the American Archaeological Expedition to Syria in 1899-1900, under the direction of Howard Crosby Butler.

*Asia Minor.*—The only excavations so far conducted in Asia Minor have been those at points along the coast. The famous excavations of Schliemann at Hissarlik, the site of ancient Troy, gave us our first glimpse of the civilization of the Mycænæan period, and showed us the existence of long eras of city building preceding even the 15th century B.C. Excavations at Pergamos, Assos and Ephesus, with smaller excavations at Cyzicus, Halicarnassus, etc., conducted by English, Germans, Americans and Austrians, have revealed remains of the later Greek and Græco-Roman periods. No excavation has been as yet conducted in the interior, but various travelers have explored the country for inscriptions and surface antiquities. Besides Greek and Latin inscriptions of the Christian and classical period, there have been found, cut on the rocks, rude figures and hieroglyphic inscriptions, belonging to an earlier civilization, the so-called Hittite, dating back perhaps as early in some cases as the 13th or 14th century B.C. These remains have been discovered all over Asia Minor, from the Mediterranean on the east to Armenia on the west and from a point a little south of the Black Sea on the north, far into Syria on the south. The inscriptions have not yet been satisfactorily deciphered,

and the language and affinity of the people who used them are not yet known, but from information derived from Babylonian and Egyptian sources we are able to fix the approximate date of the Hittites, to whom they seem to have belonged, from the 13th or 14th to the 8th century B.C. From the distribution of the inscriptions it would seem that the centre of this civilization in the time of its flower was Cappadocia or Cilicia. From Cappadocia there have also been brought, since 1887, a considerable number of clay tablets with cuneiform inscriptions, some of which are at Philadelphia but the larger part in Saint Petersburg. These show the influence of Babylonian civilization and culture in Asia Minor. Further eastward, through Armenia, inscriptions have been found in cuneiform characters, cut in the rock, partly in the Assyrian language and partly in the native language of the country, which have now been deciphered, giving evidence of the existence of powerful kingdoms in that region in the 10th and following centuries, rivals of the Assyrian power.

*Arabia.*—Up to the present time no work of excavation has been conducted in Arabia. Various travelers have explored and mapped the country, from the time of the Danish Niebuhr (1761-4) onward. These include Burckhardt (1814-16), Burton (1853, 1877-8), Palgrave (1862-3) and others. These earlier travelers explored the country, visited Mecca and studied Arabic life and habits, but did little in the way of collecting or copying inscriptions. This was done principally by Halévy (1870-1), Doughty (1876-8) and Glaser (1882-94) in the south and Euting and Huber (1883-4) in the north. These explorations were conducted under the greatest difficulties. Halévy traveled as a poor Jew, Doughty lived as a Bedouin, others professed Islam to accomplish their purpose, some, like Huber, lost their lives at the hands of fanatical natives. The inscriptions collected by Euting in northern Arabia show us the Aramæans still inhabiting that region in the 6th century B.C. The inscriptions from southern Arabia reveal the existence there as early as 1000 B.C. of civilized peoples using alphabets derived from the so-called Phœnician alphabet. We are able to trace the successions and names of certain kings and peoples, and some light has been thrown on the ancient religion and religious practices of the Arabs. Beyond this research in Arabian antiquities has not proceeded up to the present time.

*General Results.*—The general results of oriental research in Egypt and western Asia, covering in all a period of somewhat more than a century, have enabled us to trace the history and development of civilization from about 7000 B.C. onward. At about that date, research has now shown, there existed independent centres of civilization in Egypt and Babylonia, and those countries were at that time occupied by city-building and civilized peoples. By 400 B.C. a conventionalized script had been developed out of picture writing, independently in each of these countries, and the civilization of each region had assumed those definite types which we know respectively as Egyptian and Babylonian. From this point on we have in both cases written records, but no well determined system of chronology until a much later date. The civilization of Egypt, while attaining in the matter

of art, architecture and literature very much higher development than that of Babylonia, was always singularly self-centred. Babylonia was more concerned with practical life, and the application of knowledge to material. Babylonia, moreover, was always in contact with the world about it, and its civilization affected the civilization of surrounding regions to such an extent that it may fairly be claimed as the ancestor of later Western civilization. Egypt gave little to the outside world and received little from it, but, on the whole, what it received was greater than what it gave. It is Egyptian art, the painting on the Egyptian tombs, which gives us a vivid picture of the manner of Egyptian life; it is the innumerable clay tablets and business documents of Babylonia which enable us to restore in details the laws, rules, customs and commerce of the Babylonians.

The earliest civilization of Babylonia was non-Semitic, developed among a people commonly designated as Sumerian. The earliest inscriptions are written in the Sumerian language, and even as late as the Assyrian time magical and religious texts continued to be written in the same tongue. By about 3000 B.C. Semitic peoples, pouring out of Arabia, had overrun Babylonia and Syria and adopted and assimilated the civilization and religion of Sumerian Babylonia, which became by the middle or close of the 3d millennium B.C. to all intents and purposes, the civilization of the whole region from Persia on the east to the Mediterranean on the west.

In the 15th century B.C. a period of high culture having several independent centres, was reached in this ancient world. One of these centres was the Mycenaean or Aegean civilization, having its central point in Crete and the islands and shores of the Aegean Sea. So far at least as Crete was concerned, this had its own system of writing, which has not yet been deciphered. Another centre was Egypt at this period politically dominant in Syria, although the civilization and culture of the latter region continued to be Babylonian. Another centre was Babylonia, which had communicated its writing, its religion and its art to the neighboring regions of Elam, Mesopotamia, Syria, and, to some extent, Armenia and eastern Asia Minor. Perhaps we should add to these independent civilizations the Hittite, which, however, was much ruder than the rest. At this period a belt of civilization seems to have extended vaguely from China on the east to Spain on the west, and from the Danube on the north to Nubia on the south; but the highly civilized portion consisted only of the territory from Persia to Greece, and from the Hellespont to Ethiopia.

Then came a catastrophe similar in cause and result to the dark ages which followed the brilliant period of Græco-Roman civilization in the 4th and following centuries of our era. Barbarians, pressing in from the north and south alike, overwhelmed the Mycenaean-Aegean civilization, reduced Egypt to a condition of depression, and for a time almost annihilated both Assyria and Babylonia. It was at this period that barbarian Aramaean hordes, pouring out of Arabia, overran all Syria, including Palestine. These dark ages may be said to have come to an end about 1000 B.C. At least at that time a new civilization begins to dawn.

As to the dark ages of the Christian era we owe two great discoveries, one material and the other spiritual, which largely changed the character of the succeeding civilization, namely, gunpowder and the printing-press, so to these dark ages of the earlier time we owe the discovery of iron, or perhaps its adaptation to practical use, and the invention of a real alphabet, the so-called Phœnician alphabet. These two discoveries conditioned the new civilization which came into being at or about 1000 B.C. and which found its highest development to the westward in Greece and Rome from 500 B.C. onward.

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## ORIENTAL SOCIETY — ORIENTATION

**Oriental Society, American.** See AMERICAN ORIENTAL SOCIETY.

**Orienta'tion**, the adjustment and maintenance of itself by an organism in its proper position toward its environment; the acts of perceiving, assuming, and controlling its normal attitude and movements in reference to gravitation, direction, equilibrium, and other requirements of its relations to space. The ability to keep right side up, to face or move in a determined direction, to place one's self as a whole in any desired attitude, to bring the various parts of the body into definite relations with other parts, to maintain equilibrium, and constantly to control and utilize this power, are the elements of the faculty of orientation, which seems in some degree necessary to every living thing, and whose phenomena in their higher manifestations surpass present human powers of explanation.

The faculty is essentially a mental perception of a necessity for a muscular act; but so incessant and habitual is it, at least in animals possessing the power of moving, that its exercise is ordinarily unconscious, and belongs to the realm of automatic reflexes, or at least to that of subliminal consciousness.

The proof of this appears in the partial inability of young animals, notably of the higher classes, to adjust themselves to their surroundings. Babies have to acquire a knowledge of relative direction, distance, and proportion by slow degrees. So simple a matter as bringing the hand to the mouth must be learned; the first difficulty in learning to walk is to acquire the power of maintaining equilibrium; and this must be acquired anew when a grown person attempts some novel method of locomotion, as skating or the riding of the bicycle. Proof appears also in the loss or destruction of the power of orientation which follows the derangement of the brain or nervous system by certain drugs or diseases. A symptom of intoxication is staggering, and when the intoxication is excessive ability to stand or to use the limbs definitely disappears,—the power of co-ordination is lost. Some forms of insanity have a similar effect; and a characteristic of the disease locomotor ataxia is that it deprives its victim of the power of control of equilibrium (q.v.) and of the muscles used in walking; it is not muscular weakness but disorganization of the power of co-ordination. If the affected person is able to walk at all he finds it impossible to turn without falling; or when he moves will start off at right angles to the course he intended to take. A similar defect of power accompanies great sleepiness—our heads droop and we totter and progress aimlessly until well aroused. Persons walking in the dark, with nothing to guide them but the touch of the feet upon the floor, find it hard to walk straightly or firmly. Orientation, then, that is the power to maintain a proper relative attitude, to comprehend direction, and to control locomotion, depends originally upon sensation and experience, combining many factors, both psychological and physiological, often not easily separable.

At the basis lies the faculty for equilibrium, the ability to feel and to keep one's self right side up. It is a notable fact that animals stricken

with death when free to turn, as are those in the water, turn upon their backs—the part of the body that in life is kept away from the ground. This is a matter of gravity—the dorsal half of the body is the heavier. How do such creatures as fishes and low marine animals know how to resist this inclination in life, and hold themselves in the opposite or whatever may be their normal attitude toward the plane of the horizon? The only explanation is that they possess a sense of equilibrium which is supposed to reside primarily in certain organs, whose office is supplemented by various sensations, as of feeling, sight, and hearing, the influence of each varying in proportion according to the degree of nervous organization of the animal, its structure, size, shape, the medium in which it operates, etc. In the case of man and the animals nearest to him, balance is maintained by constant muscular response—in large part unconsciously, of course—to the wavering suggestions of pressure upon the soles of the feet or upon the bones and flesh of this side of the body or that, as the weight is shifted; to suggestions from the eyes in view of fixed objects, or from the ears as sounds vary in intensity, or even from the interior of the body, where organs or contained fluids report movements which must be corrected to restore the centre of gravity. The broad examples of this, which are matters of commonplace experience, such as the leaning away from a weight carried in one hand, or the outstretching of an arm to counteract a slip of the foot, or the swerving outward when rounding a curve at a rapid pace, are only large illustrations of the minute adjustments which go on incessantly in maintaining the equilibrium of animals. Underlying these adjustments, however, is the faculty, before alluded to, of perceiving when the body is in equilibrium, and this is believed to reside especially in certain organs represented in man by the labyrinth of the ear, and in the lower animals by the homologues of this structure. These are sufficiently described and illustrated in the article EAR, and consist essentially of some movable particle at the end of a nerve-filament, which, by its change of place as the body moves, informs the mind of the direction and degree of the departure from a state of equilibrium. Prominent among these special organs are those of the lateral line in fishes (see LATERAL LINE ORGANS), whose perceptions of vibrations make them akin to organs of hearing; but the higher purpose of which is believed to be equilibrial. With these and similar organs in the lower ranks of animals the complicated labyrinth of the ear in the higher vertebrates and in man is allied by descent; and unquestionably the semicircular canals are the seat of our perception or sense of levelness, change of direction, relative position, acceleration of movement, rotatory motion, and all the rest. The orientation of the body thus depends primarily upon the index furnished by the inner organs of the ear.

Whether this is to be regarded as a "sixth sense," as it is often styled, is by no means clear; but some of the manifestations of the power of animals and some men to perceive, take, and keep a course in the entire absence of anything in the way of guidance visible to human understanding, transcend our power of explanation at present. The extraordinary faculty which savages have inherited from primitive men of

finding their way through extensive forests or over wide plains that present no landmarks cannot be explained by the men themselves—they say they *feel* that the direction they follow is the right one, and become uneasy when they deviate from it. A similar explanation will alone account for the unerring manner in which birds migrate across hundreds of miles of open ocean to some island or point of coast annually revisited.

The literature of the subject is mainly French and German, the latest summary being Hartmann, 'Die Orientierung' (Leipsic 1902); and Loeb, 'Comparative Physiology of the Brain' (New York 1902).

**Oriflamme**, the former royal standard of France, originally the church banner of the Abbey of Saint Denis, which was presented by the abbot to the lord protector of the convent whenever it was necessary to take up arms for the preservation of its rights and possessions. It was a piece of red taffeta fixed on a golden spear, in the form of a banner, and cut into three points, each of which was adorned with a tassel of green silk. When Philip I. afterward united Vexin to the possessions of the crown, it fell to him to bear the banner as protector of the abbey. It was then carried with the armies, and eventually became the great standard of the kingdom. Since the time of Charles VII. it has never been carried into battle.

**Origen**, *ôr'î-jên*, ecclesiastical writer, surnamed **ADAMANTIUS**: b. Alexandria 185; d. Tyre 254. He was early instructed by his father in the Christian religion. His teachers were Clement of Alexandria and Ammonius. In his early youth he gave proofs of greatness of soul. When his father was thrown into prison during the persecution of Severus, Origen exhorted him to die rather than apostatize. After the martyrdom of his father in 202 he maintained his mother and sister by giving instructions in grammar. At 18 he was appointed to instruct the believers in Alexandria. Males and females crowded to his lectures. To escape calumny he mutilated himself, thinking the act justified by the New Testament, though afterward he expressed sorrow for the act. After the death of Severus (211) Origen went to Rome, where he gained friends and admirers, and subsequently, at the request of Bishop Demetrius, continued his instructions at Alexandria. A popular tumult compelled him to flee to Palestine. He was permitted by the bishops there to preach in their assemblies. On his way to Caesarea, in Palestine, he was ordained presbyter by the bishops who were there assembled. This laid the foundations for the persecutions which embittered the remainder of his life. Demetrius maintained that he alone had the right to ordain Origen. He deprived Origen of his priestly office, prohibited him from teaching in Alexandria, whither he had returned, banished and excommunicated him. This sentence was confirmed at Rome and by most of the other bishops. But the Churches of Greece and Asia sustained Origen, who denied that he was guilty of the errors of which he was accused. In the year 231 Demetrius died, and Origen enjoyed tranquillity. The persecution under Maximin forced him to remain for two years in concealment. When peace was restored to the Church in 237, he took advan-

tage of it to travel to Athens. He then went to Arabia to refute Bishop Beryllus, who affirmed that the divine nature of Christ did not exist before his human nature. Beryllus recanted, and thanked Origen for his instructions. In the Decian persecution Origen was thrown into prison, and subjected to the extreme sufferings, from whose severity he died. Few authors have written so much as Origen; few men have been attacked with such virulence, both during his life and after his death. He was reproached with blending the Christian doctrines with Platonism, particularly in his book, 'De Principiis'; but he gives his opinions only as a possibility; moreover, "heretics," he says, "corrupted his writings." He has been accused, without reason, of favoring materialism. Of his works, besides the one just mentioned, there are extant only his 'Exhortation to Martyrdom,' commentaries, homilies, and scholia on the Holy Scriptures, nothing more of which we have than free translations. His critical talent is shown in his 'Hexapla,' of which an edition was published by Montfaucón, and afterward by F. Field (1875). In 1896 further portions of the 'Hexapla' were found at Milan. His work against Celsus is the most complete defense of Christianity of which antiquity can boast. His works were edited by Lommatsch in 25 volumes. Consult: Möller, 'Geschichte der Kosmologie der Griechischen Kirche bis auf Origenes' (1860); Thomasius, 'Origenes' (1837); Freppel, 'Origène' (1868); Farrar, 'Lives of the Fathers' (1889); Fairweather, 'Origen and Greek Patristic Theology' (1901).

**Origin of Species.** See DARWINIAN THEORY.

**Original Package**, a term used in American Inter-State Commerce, arising from certain decisions of the United States Supreme Court, and having to do with the packages in which goods are shipped. In 1890 the Supreme Court, in the case of *Leisy & Company v. Hardin*, held that the plaintiffs, brewers in Illinois, had the right to bring beer into Iowa and sell it in the original packages, regardless of the Iowa prohibitory law. Their decision rested on the right of Congress to have exclusive control of interstate commerce. Congress passed an act, known as the Wilson Law, 8 Aug. 1890, giving the State control of the liquors so imported, though in the original packages.

**Original Sin**, the sin which all the descendants of Adam inherit from their first progenitor. The doctrine of Original Sin is a first postulate of Christianity in the scheme of man's redemption by Christ. The first explicit statement is to be found in Saint Paul (*Rom. v. 12 et seq.*): "As through one man sin came into the world, and death by sin, and so death penetrated to all men, because all sinned . . . for if by the trespass of one the many died, much more the grace and the gift in the grace of the one man Jesus Christ abounded to the many." The ante-Nicene Greek Fathers say little about the doctrine, and this only incidentally. When they do mention the subject it is always in the spirit of St. Paul's statement, that all mankind fell in Adam, and that through this first sin death entered into the world, the will became weakened, reason obscured, and concupiscence disordered. There is also little to be gathered

from the Latin Fathers of the ante-Nicene Age, for the doctrine had not become the subject of controversy, and so awakened but slight theological discussion or formulation. Wherever mentioned by them, the prevailing idea at bottom was the Pauline doctrine of the fall of the human race in Adam, with its dire consequences, which are to be remedied only by the grace and merits of Christ.

Saint Augustine (q.v.) was the first Latin Father to treat it systematically and extensively in his controversy with the Pelagians in relation to grace, free-will, predestination, etc. His teaching is succinctly stated in the following passage: "He (Adam), exiled after sin, bound his offspring also, which by sinning he had corrupted, as it were, in the root, under the penalty of death and condemnation, so that all progeny born of himself and his wife . . . should draw to itself original sin, and thence be drawn through diverse errors and pains to that last and endless torture with the angels, who deserted and corrupted (others), and with those who inherit and share in their portion." (Euchirid. ch. 10). Saint Augustine's exposition of the doctrine exercised a great and lasting influence throughout the subsequent centuries, and has been, in its broader outlines, followed by the theologians of the Middle Ages. A more definite and scientific formulation grew up with the development of the stricter methods of scholastic philosophy, which reached its complete expansion in the 13th century. Saint Thomas Aquinas (q.v.), the greatest theologian of the scholastic period, declares that the essence of original sin consists in the "privation of original justice," understanding by original justice that state in which Adam was created and lived prior to the fall, with all the gifts of grace which God had bestowed upon him with the view to his supernatural end in ultimate possession of the Divine Vision. All this Adam forfeited when he fell, and that forfeiture passed by natural generation to all his descendants. In this view original sin is not a positive evil added to human nature, but the deprivation of a supernatural good originally bestowed upon the race in the headship of Adam. Following this original loss, as a penalty of Adam's transgression, came the direful consequences of death, the confusion and disorders of all the human faculties, and the sting of concupiscence. This is the accepted teaching of the Roman Catholic Church, and the Council of Trent defines as of faith, that Adam lost original justice, not only for himself, but also for us; that he "poured sin, which is the death of the soul, into the whole human race," and that this sin comes, not by imitation of Adam's transgression, but by propagation from him.

The reformers of the 16th century generally held to a very strict interpretation of the Augustinian view, and regarded original sin as a complete corruption of the will and reason. Luther held that it consisted in concupiscence. The Lutheran and the Reformed Churches both held similar views regarding original sin, following Calvin rather than Zwingli, who looked upon it as an evil or disease, and only as a sin when a commandment was thereby transgressed. The Arminians and Socinians, on the other hand, discountenanced

the ecclesiastical view of the doctrine. While the Protestant Church maintained that Jesus alone was absolutely free from original sin, the Roman Catholic Church exempts the Virgin Mary from its dominion. Uniform adhesion to the Augustinian dogma on the part of the reformers was by no means the case. From Luther's dispute with Erasmus, who would only admit a weakness of the free-will and not its destruction, up to the present time the doctrine has been variously defended and attacked, philosophers as well as theologians taking part in the controversy. Kant showed the moral significance of the doctrine, and represented original sin as an inherent tendency in man's nature to evil. Rationalism, on the other hand, taught with Pelagius that it was only a weakness of man's nature with regard to knowledge and his power for good. According to Hegel original sin is nothing else than the necessary finitude and limitation of our nature. In recent times orthodox theologians, such as Olshausen, Hengstenberg, and others, have stood up for the Augustinian doctrine, while those of the liberal school have modified it in various ways. Consult: Müller, 'Christliche Lehre von der Sünde' (1888); Clemm, 'Christliche Lehre von der Sünde' (1897); Hodge, 'Systematic Theology' (1871); Landis, 'Doctrine of Original Sin' (1885).

Orillia, *ô-rîl'î-a*, Canada, town and port of entry of Simcoe County, Ontario, at the head of Lake Couchiching, on the Grand Trunk Railway; 86 miles north of Toronto, 28 miles north-east of Barrie. It is a favorite fishing and summer resort, and has steamboat communication with other points on the lake and on Lake Simcoe, connected with Lake Couchiching by a narrow strait. It has good hotels, several churches, and a Provincial Lunatic Asylum is located there. It enjoys a thriving trade in lumber and farm-produce; has manufactures of leather, foundry products, lumber, shingles, and planing and grist mill products; and has banks, electric lights, etc.

Orinoco, *ô-rî-nô-kô*, Venezuela, one of the three great South American rivers, rising in the Sierra Parima, on the Brazilian frontier, near lat. 3° 40' N., lon. 64° W., and after a winding course of over 1,500 miles, during which it forms part of the boundary with Colombia, flowing into the Atlantic through a many-mouthed delta between lon. 60° 20' and 62° 30' W., opposite the island of Trinidad. The area of the drainage basin is estimated at 368,600 square miles. Its exact sources were not discovered until 1886. It flows at first west by north, a mountain stream, as far as lon. 67° W. A little below Esmeralda, in lon. 65° 50' W., it divides and sends off to the south, the Cassiquiare, a natural canal 180 miles long with a rapid trend to the Rio Negro, a tributary of the Amazon. The Orinoco and Amazon are also connected by the Pimichin stream and the Terni branch of the Atabapo, an affluent of the Orinoco. Other important tributaries are the Guaviare, the Meta, Apure, Arauca, Caura, and Caroni. Two remarkable rapids occur in the upper parts of the Orinoco, called the Atures and Maypures, the one in lat. 5° 8' N., the other about 36 miles lower down. These rapids consist of a countless number of little cascades succeeding each other like steps, and, where numerous, islands and



## ORIOLE — ORISKANY STAGE

rocks so restrict the bed of the river that out of a breadth of 8,000 feet there only remains an open channel of 20 feet. From these rapids the river is navigable to its mouth, a distance of about 870 miles.

At 600 miles from the ocean it is from 5,000 to 6,000 yards wide; at Angostura or Ciudad Bolivar, 370 miles from its mouth, 7,500 yards; and in March 65 fathoms deep. About 120 miles from the Atlantic its delta of 8,500 square miles begins. Of the numerous mouths which reach the ocean over 165 miles of coast line, only seven are navigable. The waterway principally used by ocean-going vessels, which penetrate up to Ciudad Bolivar (Angostura), is the Boca de Navios, varying in width from  $3\frac{3}{4}$  to 23 miles. Most of the larger affluents are also navigable for considerable distances, the Meta, for instance, to within 60 miles of Bogotá, the capital of Colombia. As a rule the river floods the districts adjoining its banks from May to January, the country under water sometimes measuring 100 miles across. The magnificence of the scenery on the banks of the Orinoco is beyond description. Forests of great extent are filled with aromatic trees; birds of beautiful plumage are common, and hordes of monkeys disport themselves among the branches. Beyond these forests enormous plains extend their verdant surfaces farther than the eye can reach. The whole course of the river is in Venezuela.

**O'riole**, any of certain passerine birds, distinguished by the predominance of a golden hue in their colors. The orioles of the Old and New Worlds belong to quite distinct families. The American orioles constitute, with the black-birds, the meadow-larks, bobolinks, and cow-birds, the family *Icteridae*, of which they are often considered to form a subfamily (*Icterinae*), and which is related on the one hand, through the meadow-larks, to the starlings (*Sturnidae*) of Europe, and on the other, through the bobolink, to the finches (*Fringillidae*). From the other members of the family the orioles may be distinguished by the slender, acute, slightly decurved bill, small, weak feet, and the strongly contrasting black with yellow, golden or reddish colors of the males, and the usually plainer females. Practically all of the 40 or so species of American orioles belong to the typical genus *Icterus* whose species abound in tropical America, where they are called troupials. Within the limits of the United States seven species occur, but three of these are really Mexican birds which wander over our southwestern border, and another is a rare straggler from South America. Several of the tropical species are imported as cage-birds. The Baltimore oriole, golden robin or hangnest (*I. galbula*), the male of which bears the rich golden and black colors of Lord Baltimore's livery, is one of the best known and most conspicuous migratory birds of the east. It occupies the entire territory east of the Rocky Mountains, and northward into Canada, and in winter migrates to Central and South America. From the Rocky Mountains to the Pacific it is replaced by the closely related *I. bullocki*. The Baltimore oriole is noted alike for its great beauty, its vivaciousness, its clear, loud whistle constantly repeated in May and June, and its skilfully woven, pensile nest, formed of grasses

and fibres and suspended from the endmost twigs of high branches, often of elm and sycamore trees.

The orchard oriole (*I. spurius*) has a similar range somewhat curtailed northward and westward. It is a smaller bird, and the adult male is black and reddish chestnut, but assumes these colors only when three years old; the young male resembles the female in being dull yellow, but in the second year has a black face and throat. In habits it generally resembles the Baltimore oriole, but is preeminently a denizen of orchards, and its song, nest and eggs all present specific differences.

The orioles of Europe and of the Old World generally, except Africa, belong to the family *Oriolidae*, which is related to the birds-of-Paradise. The best known species is the golden oriole, which has a stout bill and bright yellow plumage with black wings and tail. Like our orioles it constructs a hanging nest. Certain species of orioles of the genus *Mimeta*, inhabiting islands of the Malay Archipelago, so exactly resemble associated species of friar-bird (*Philemon*) that Wallace considers them to be true mimics.

Consult American and European Ornithologies generally; Jordan, 'Birds of India' (1862); Wallace, 'Tropical Nature' (1878).

**Orión**, ô-rê-ôn', Philippines, a pueblo of the province of Bataán, Luzon, situated near the west shore of Manila Bay, five miles south of Balango. It is on the principal road of the province. Pop. 10,370.

**Orion**, ô-rî-ôn, (1) in astronomy, one of Ptolemy's constellations and the most marked in the heavens. It is divided by the equator into two nearly equal portions. When all its bright stars are known, many of the surrounding ones may readily be found by alignments; (2) in Greek mythology, a heroic youth, son of Hyrieus of Hyria. Eôs became enamored of him. The gods were jealous of her love, and Artemis slew him with her arrows in the Island of Ortygia. He was of such gigantic size that when standing in the middle of the sea the water only reached his shoulders. According to another legend, he died of the sting of a scorpion.

**Oriskany**, ô-ris'kâ-nî, **Battle of**, in American history, an engagement between the British and Indians and the American forces, near Oriskany, N. Y., 10 miles from Fort Stanwix, 6 Aug. 1777. The opposing forces each numbered about 800 men. The Americans, under General Herkimer, started to relieve Fort Stanwix, which was besieged by Saint Leger, Brant and his Indians. At Oriskany he halted and attempted to concert an attack and a sortie. The plan miscarried. Herkimer advanced and was attacked by the Indians and Tories in a deep ravine. The battle raged furiously for hours, despite a terrific thunderstorm, and was one of the most cruel and bloody of the Revolutionary War. Each side lost a third of its number. The Americans remained masters of the field, although badly disabled. The sortie from the fort was a success, and badly crippled the enemy. Gen. Herkimer was mortally wounded in the battle and died several days later.

**Oriskany Stage**, in geology, the lowest group of the Devonian system, so called from Oriskany Falls, N. Y., northeast of Utica, and







CHESTNUT-SIDED WARBLER (above). BALTIMORE ORIOLE (below).



## ORIZABA — ORLEANS

apparently the northern limit of the stage in New York, the name being due to the New York Geological Survey. In Maine it is several thousand feet thick, but is much thinner in western New Jersey, eastern Pennsylvania, Maryland, Virginia, and West Virginia. It also occurs in Ontario, and crops out in southern Illinois.

**Orizaba**, ò-rē-sā'bā, Mexico. One of the chief cities of the State of Vera Cruz; situated 81 miles southwest from the port of Vera Cruz and 182 miles southeast from the City of Mexico, on the line of the Mexican railway, at the entrance to the coffee zone. Its elevation is 4,030 feet above sea level and its climate throughout the entire year is delightful. In the immediate vicinity are three cotton mills which, combined, employ some 5,000 operatives. These are all owned by a French corporation and employ a capital of some \$15,000,000. Within the city limits are located the great Santa Gertrudis jute mills, owned in England, the Moctezuma brewery, cigar factories, and a number of other industries, and the Mendizabal hospital. In a nearby suburb are stone and marble quarries which annually supply enormous quantities of building material of very superior quality, and to the south, toward Cordoba, which is situated in the centre of the tropical fruit interest, are great sugar cane plantations and sugar mills. In the vicinity is a wealth of water power which is sufficient for every need. The most notable structures are the State Normal School, completed at a cost of \$500,000, the City Hall, old Cathedral, cotton mills, jute mills, brewery and Hotel de France. The streets are all paved with stone, and many of them are bordered by tropical growths of extravagant luxuriance. The street railway system extends several miles into the country in two or three directions. There is a local bank, —the Bank of Orizaba,—and there are branches of the National and London and Mexico Bank of Mexico City, and the Mercantile Bank of Vera Cruz. The Preparatory College maintains a technical museum, and two public libraries—one connected with the Preparatory School and the other with the "Carcel Municipal"—contain 12,000 volumes. Pop. about 32,000.

**Orizaba**, Mexico, a volcanic peak, 60 miles west of Vera Cruz, on the boundary between the states of Puebla and Vera Cruz. It was called by the ancient Mexicans Citlatipetl, or Mountain of the Star (from *citlalin*, star, and *tepetl*, mountain), probably from the circumstance that when in a state of eruption the flame at its summit appeared, when seen from a distance, like an immense star on the verge of the horizon. It has an altitude of 18,200 feet, and is the first land visible on approaching the coast in the direction of Vera Cruz. Its most considerable eruptions known to history took place between 1545 and 1566. In common with the other great volcanoes of Mexico, Popocatepetl, Tuxtla, Jorullo, and Colima, it seems to have lost most of its activity, and to be in a state of repose.

**Orkney** (òrk'nī) Islands, Scotland, an archipelago forming a single county, separated from the northern coast of Caithness, by the Pentland Firth, from six to eight miles broad. There are in all about thirteen islands of con-

siderable size, with a number of smaller dispersed over the archipelago. They extend from lat. 58° 42' to 59° 23' N.; lon. 2° 22' and 3° 25' W.; aggregate area, 390 square miles, or 249,565 acres, of which about 107,000 are under culture. Among the larger islands are Pomona or Mainland, Hoy, South and North Ronaldsay, Westray, Sanday, Eday, Stronsay, Ronsay, and Shapinsay. Of the whole about 28 are usually inhabited, although five or six do not contain a dozen inhabitants each. Hoy is the only island of the group that can be called mountainous, and here the highest elevation is but 1,600 feet. With the exception of a granitic district near Stromness, the islands are of old red sandstone formation. The climate is moist, but not cold, being tempered by the Gulf Stream that sweeps around the shores. Oats, turnips, and hay are the chief crops, and 16,000 acres of land are devoted to permanent pasture. The common breeds of sheep, cattle, and horses were small, but since the introduction of good stock from the south, have become large and valuable. Rabbits and poultry are numerous. The herring and cod fisheries compensate in some parts the absence or defective development of other resources, and large numbers of lobsters are annually sent to London. The principal manufactures are hosiery, made by the females, and the building of boats, making of sails, nets, and cordage. The chief town is Kirkwall.

As the Orcaes mention is made of the islands by several ancient geographers and classical writers, Ptolemy, Pliny the Elder, Mela, Solinus and others; the prehistoric monuments include the stennis monoliths, the Mæshowe tumulus, and a Pictish fort. It is probable that the Picts possessed the islands until the subversion of the Pictish kingdom in Scotland by Kenneth II. In 1099 they were assigned by King Donald Bane to the king of Norway and remained in possession of the Norwegians until the middle of the 13th century, when Magnus, king of Norway, transferred them to Alexander, king of Scotland.

**Orlando**, òr-lān'dō, Florida, city, county-seat of Orange County; on railroads owned by the Seaboard Air Line Railway Company and the plant System, about 100 miles south by west of Saint Augustine. It is in a fruit growing region and its principal industries are connected with the marketing of the fruit of the surrounding country.

**Orlando Furioso**, òr-lān'dō foo-rē-sō (Italian, "Orlando Mad," or "Mad Roland"), a romantic poem by Ariosto, of which 40 cantos were published in 1516, and to which the author added six more, the whole poem being published in 1532. It is a continuation of Boiardo's 'Orlando Innamorato' ('Orlando in Love'), and is a somewhat ironical romance of chivalry. See ARIOSTO, LUDOVICO; BOIARDO, MATTEO MARIA.

**Orlando Innamorato**, òr-lān'dō òr-lān'dō (Italian, "Orlando in Love"), a poetical romance by Matteo Maria Boiardo (q.v.), the subject of which is the love of Orlando or Roland for Angelica. Unfinished by the author, it was continued by Ariosto in his 'Orlando Furioso' (q.v.).

**Orleans**, òr-lē-anz (Fr. òr-lā-àn), the name of several princely houses of France, lords of the county (later the duchy) of Orléans. In



1344 it was an appanage of the cadet branch of the reigning Valois, and under the Bourbons it held a corresponding place. The various families of Orléans may be distinguished as follows: 1st, dating from 1344, containing the single name of Philippe, who was 4th son of Philip VI. and died in 1375, his 40th year, without legitimate heirs, the duchy therefore reverting to the crown; 2d, dating from 1397, when Louis, Count of Valois, b. 1372, d. 1407, received the duchy from his brother, Charles VI., and terminated in 1498 by the accession of the then incumbent to the throne as Louis XII.; this Louis (q.v.) was son of the poet Charles of Orléans (see ORLÉANS, CHARLES, DUKE OF); the 3d, like the first, began and ended with a single duke, Jean Baptiste Gaston (q.v.), brother of Louis XIII., who held it from 1626 to 1660; the 4th important grant of the title was to Philippe, brother of Louis XIV., b. 21 Sept. 1640; d. 9 June 1701, the founder of the House of Orléans-Bourbon, of which only one member has been king of France, namely Louis Philippe (q.v.). To this house the Orleanist claimants of the French throne belong.

**Orléans, Charles, DUKE OF**, commonly called CHARLES D'ORLÉANS, French poet and soldier, count of Angoulême: b. Paris 26 May 1391; d. Amboise 4 Jan. 1465. He succeeded to the duchy in 1407 on the death of his father, Louis, and like him took a prominent place in French politics, becoming a leader of the party opposing Burgundy and England. Wounded at Agincourt in 1415, he was taken captive to England and imprisoned there, probably with little or no severity, being so important a hostage, until 1439. He then married Marie de Clèves, niece of Philippe the Good of Burgundy and thus aroused suspicion against himself at court, where alliances with Burgundy were not looked upon with favor. Charles d'Orléans spent his last years in seclusion from public activity, but was famed as an entertainer and hospitable patron of poets and artists. His poems, including chansons, rondeaux, ballades, etc., some in French, some in Latin, and some in English, written during his captivity, are intensely subjective, entirely free from patriotic feeling or any thought save for his own sorrows, joys and loves; they were edited by d'Héricault (1874). Consult Beaufrès, 'Etude sur la Vie et les Poésies de Charles d'Orléans' (1861).

**Orléans, Hélène Louise Elizabeth, DUCHESS OF**, wife of the Duke of Orléans, Ferdinand, son of Louis of Philippe: b. Ludwigslust 24 Jan. 1814; d. Richmond, England, 18 May 1858. The daughter of Friedrich Ludwig, Grand Duke of Mecklenburg-Schwerin, she married 30 May 1837, lost her husband 13 July 1842, and devoted herself to the education of her sons, the Comte de Paris (see PARIS, LOUIS PHILIPPE ALBERT, COMTE DE), and the Duc de Chartres, in whose behalf in 1848, after the abdication of Louis Philippe, their grandfather, she appeared in vain to the National Assembly. She removed, first to Erms, then to Eisenach, and finally to England. She was a model of German wifely virtues and a woman of many accomplishments. Consult the popular biography in German by Schubert (8th ed. 1877).

**Orléans, Henri, dñ-rè, PRINCE OF**, French explorer, eldest son of Robert, Duc de Chartres:

b. Ham, near Richmond, Surrey, England, 6 Oct. 1867; d. Saigon, Indo-China, 9 Aug. 1901. At 22 with Bonvalot he traveled through central Asia to Tonquin; received the medal of the French Geographical Society in 1890, having traveled through India, Afghanistan, and Japan in the interval; and in the next six years explored Abyssinia (1891), Laos and Siam, Madagascar (1894), and Tibet and Yunnan (1895-6), discovering the sources of the Lrawady on this last journey. He gained great popularity in France, notably by his bold colonial policy, which was a constant source of irritation to England; and yet his bid for the favor of the army in his defense of it during the Dreyfus case was unsuccessful, being rather too open. His experiences in Abyssinia led him to criticize harshly the Italian officers in captivity there, and in 1897 he was challenged to a duel and wounded by the Count of Tatin. Early in 1901 he left France for Annam, where he died in August. He wrote: 'Six Mois aux Indes' (1889); 'De Paris au Tonkin et travers le Tibet indochinois' (1891); 'Une Excursion en Indo-Chine' (1892); 'Autour du Tonkin' (1893); and 'A Madagascar' (1895).

**Orléans, Jean Baptiste Gaston, shôn bāt-tèst gās-tôn, DUKE OF**, third son of Henry IV. of France, and brother of Louis XIII.: b. Fontainebleau 25 April 1608; d. Blois 2 Feb. 1660. His character was weak and yielding, and he was continually involved in plots, first against his brother, Louis XIII., and Richelieu, and then against Anne of Austria and Mazarin. In 1626 he refused to marry Mlle. de Montpensier at Richelieu's bidding, being a mere tool of the Cardinal's enemies at court, and entered a conspiracy against Richelieu's life, which was discovered and crushed. The Duke lived temporarily at peace with Richelieu, only to join Marie de' Medici, his mother, in a new intrigue against the minister in 1631, which resulted in the complete triumph of Richelieu, and the flight of the Duke to Lorraine. There in 1631 he married Marguerite, sister of Charles IV., Duke of Lorraine. He returned to France in 1634, plotted to kill Richelieu in 1636, purchasing his own pardon by sacrificing the lives of his accomplices; joined the plot of Cinq Mars in 1642, but again escaped punishment; and after the death of Louis XIII. became lieutenant-general of the realm (1643). But his part in the Fronde, where he was clearly the tool of De Retz, was too flagrant to be passed over and in 1652 he was banished from court to Blois. Consult his 'Mémoires,' written by Mlle. de Montpensier (q.v.).

**Orléans, Louis Albert Philippe, COMTE DE PARIS.** See PARIS, LOUIS ALBERT PHILIPPE, COMTE DE.

**Orléans, Louis Philippe Joseph, loo-è-fè-lèp zhō-zèf, DUKE OF**, great-grandson of the Regent of France, Philippe, Duke of Orléans: b. St. Cloud 13 April 1747; d. Paris 6 Nov. 1793. Duke of Montpensier during his grandfather's last years, and from 1752 to 1785 Duke of Chartres, he succeeded his father in the last named year, having married in 1769 Louise Marie Adélaïde, daughter of the Duke of Penthièvre, and having shown himself a voluptuary like the Regent and governed by strange whims. The accusation of cowardice brought against

him for his part in the battle of Ouessant and the refusal to make him grand-admiral, in spite of his hereditary right to that post, made him a bitter enemy of the court; in 1787 he was a member of the Assembly of Notables, and was exiled as a result. With the approach of the Revolution he gave up his rank, became a pronounced republican, joined the Jacobins (1789), assumed the name of Citizen Philip Egalité, voted with some degree of moderation in the Constituent Assembly, but in the convention joined the Mountain and voted for the death of the king. This action seems to have opened the eyes of his colleagues to his apparent desire to be made king himself, and 6 April 1793 the arrest of all members of the Orléans family was voted by the Convention. He was declared innocent by the tribunal of the Department Bouches du Rhône; but was found guilty of conspiracy against the integrity of the Republic, upon no good evidence, it seems, by the Revolutionary Tribunal, and died bravely. Consult the exhaustive article by Monin in 'La Grande Encyclopédie'; and the biographies by Tournois (1842-3), Montjoie (1796), Ducoin (1845), and Crétineau-Joly (1862); also Carlyle, 'French Revolution.'

**Orléans, Louis Philippe Robert, rō-bār,** DUKE OF, present Orleanist claimant to the French crown, son of the Comte de Paris: b. Twickenham, England, 6 Feb. 1869. He was educated in France, was exiled by the law of 23 June 1886, and in 1890 to rouse Orleanist sympathy returned to France and attempted to enter the army. He was sentenced to four years' imprisonment on 6 Feb. 1890, but was pardoned and sent out of France in June of the same year, the government realizing that his punishment might aid the royalist cause. In 1894 upon the death of his father he became the recognized leader of the Royalists; he married 5 Nov. 1896 Maria Dorothea, archduchess of Austria.

**Orléans, Philippe, DUKE OF,** son of Louis XIII., styled 'Monsieur' during the reign of his brother Louis XIV.: b. St. Germain 21 Sept. 1640; d. St. Cloud 9 June 1701. Originally Duke of Anjou, in 1660 he succeeded Jean Baptiste Gaston, Duke of Orléans (q.v.), his uncle; in 1661 married Henrietta, sister of Charles II. of England, of whom he was very jealous, even resenting the favor shown her by Louis, who made use of her in effecting his alliance with the English king in 1670. Henrietta died in the same year, possibly poisoned; and in 1671 the Duke married Charlotte Elizabeth, daughter of the Elector Palatine. He fought in the Netherlands against William of Orange with such success that his royal brother relieved him of command, fearing his growing prestige. His two daughters by his first marriage were Marie Louise (1662-89), wife of Charles II. of Spain, and Anne Marie (1669-1728), wife of Victor Amadeus of Savoy; by the second marriage he had a son, Philippe (q.v.); and a daughter Elizabeth Charlotte (1676-1744), who married in 1698 Leopold of Lorraine.

**Orléans, Philippe, DUKE OF,** son of the preceding, and regent of France: b. St. Cloud 2 Aug. 1674; d. Versailles 2 Dec. 1723. Accord-

ing to the custom established by his father he bore the title of Duc de Chartres as eldest (only) son. He was able but somewhat profligate; married in 1692 at the wish of Louis XIV., Mlle. de Blois, the king's daughter by Mme. de Montespan; quickly made himself famous as a soldier by his exploits at Mons (1691), Steenkirk (1692) and Neerwinden (1693); and like his father was practically removed from the army because of the spite of Louis XIV. until his father's death. He was defeated at Turin in 1706 by Prince Eugene, but more than regained his laurels in Spain in 1708 by the brilliant capture of Lerida. His success and the rumor of intrigues with the English to make him king of Spain enforced renewed retirement in 1708. The successive deaths of the Dauphin and the Duke and Duchess of Burgundy and their son in 1711-12 were laid by gossips to his door, but he seems to have been more occupied at this time with alchemy, arts, letters, and a life of pleasure than with politics. By right of birth he became (1715) regent during the minority of Louis XV. His policy was bold, quite the reverse in its details from that of Louis XIV.; he restored the power of the nobles; withdrew laws against Protestants; aimed at canceling the revocation of the Edict of Nantes; joined the Quadruple Alliance, and in other ways showed himself a friend of England; attempted to reform French finance, but made bad worse by acting on the advice of John Law (q.v.); and even after 1723 when the king came of age retained much actual power for a time through Dubois, whom he had made prime minister. His vicious and debauched habits were not broken nor changed in his later years, and he was accused, apparently with right, of criminal intemperance even with his own daughter, the Duchesse de Berry. Consult the biographies by La Motte, Capéfigue, and Baudrillart; and the histories of the regency by Lemontey, Piossens, Marmontel, Lacretelle, and Wiesener; as well as the 'Mémoires' of St. Simon, Marais, and Buvat.

**Orléans, France,** a city, capital of the department of the Loiret, situated on the right bank of the Loire, 68 miles southwest of Paris. A magnificent bridge of nine arches connects it with the populous faubourg of St. Marceau. The houses are well-built, but the streets in general are narrow and crooked. It has some handsome public squares, a Gothic cathedral; two hôtels-de-ville; the Palais de Justice; the Musée, containing a curious collection of local antiquities; the theatre, and other edifices worthy of notice. The manufactures and trade of the place are considerable, but have lost much of their former importance; there are several worsted and cotton mills, numerous sugar-refineries, vinegar works, breweries, and manufactures of hosiery, ironmongery, pottery, etc. Orléans was the Gallic Genabum destroyed by Cæsar 52 B.C., and rebuilt as Aurelianum, whence the corruption Orléans. Philip of Valois erected Orléans into a duchy and peerage in favor of his son, and Orléans has since continued to give the title of duke to a prince of the royal line of France. Philip the Fair instituted a university here in 1312, which formerly had great celebrity. In 1428 the city sustained a siege against the English, and was relieved by

the Maid of Orléans (see JOAN OF ARC), whose statue in bronze stands in one of the public squares. It was taken and retaken more than once in the Franco-German war in the latter part of 1870.

**Orléans, Isle of, Canada**, in the Saint Lawrence River, below Quebec and Levis, at the head of the estuary, 650 miles from the ocean at Cabot Strait. It is dependent to Montgomery County, is about 22 miles long by five to six broad, and has an area of 70 square miles. On account of its numerous grape vines Jacques Cartier first named it the Isle of Bacchus, in 1535. The soil is fertile, well-wooded, and fruit culture is the chief industry. The villages along its shores are popular picnic and summer resorts, and include Beaulieu, St. Pierre, Ste. Famille, St. François, St. Jean, St. Laurent, d'Orléans being usually affixed to particularize them. General Wolfe encamped here in 1759 before the siege of Quebec. Pop. about 6,000.

**Orleans, Territory of**, in American history, a name formerly applied to a section of the United States. When the large tract of northwest territory was purchased from France by the United States in 1804, under the name of Louisiana, the district was divided by Congress into territories, called the District of Louisiana and the Territory of Orleans, the latter being the present area of the State of Louisiana. In February 1811, an act was passed "to enable the people of the Territory of Orleans to form a constitution and State Government," and on 12 April 1812 an act was passed for the admission of the State of Louisiana into the Union. See LOUISIANA.

**Orley, ör'li, Bernaert (BAREND, BERNHARD) van**, Dutch painter: b. Brussels 1491 or 1492; d. there 6 Jan. 1542. He studied in Italy between 1509 and 1515 and imitated the Italian masters, especially Raphael. Returning to Brussels he was appointed court painter to Margaret of Parma (1515) and to her successor Maria of Hungary (1820). While he began his career as a follower of Gerard David he altered it after his Italian travels, but in his modeling and color scheme he never forsook the traditions of the Dutch school. His works indicate keen power of observation and a delicate perception of beauty in form and expression. Among the best of them are: 'Scenes from the Life of Saint Thomas and Saint Matthew' (altarpiece), in the Imperial Museum, Berlin; 'Sorrows of Job' (triptych) in the Brussels Museum; 'The Flight into Egypt' (in the Liverpool Royal Institution); 'Worship of the Holy Trinity' (Lübeck, Saint Mary's Church); and 'The Holy Family' (in the Dresden Gallery). He also furnished designs for wall hangings which were executed in Brussels tapestry, of which there is an example in the Louvre, 'The Imperial Hunt,' executed for the Emperor Charles V.

**Orloff, ör'löf'**, a Russian noble family, founded 1689 by Ivan, who was condemned to death by Peter the Great, but pardoned for his bravery and coolness. His grandson GRIGORI (1734-83), fought in the Seven Years' war, became the paramour of Catherine II., to whom he gave the famous Orloff diamond, or Koh-i-

Nur, weighing 193 carats, and now a crown jewel. But she dismissed him for Potemkin. His brother ALEXEI (1737-1808) plotted against Peter III., and in 1770 won the battle of Tchesme and the name Tchesmensky. The Orloff breed of horses is named after him and is a cross of his introduction into Russia. GRIGORI VLADIMIR (1777-1826) spent his last years in Paris, wrote in French on Italian history, and edited a polyglot Kryloff. ALEXEI FEDOROVITCH (1781-1861), a general in the Napoleonic wars, and a famous diplomat, in 1833 effected the Treaty of Unkiar-Skelessi, giving Russia the sole right to pass the Dardanelles. His son NIKOLAI (1827-85) advocated religious toleration and the abolition of corporal punishment.

**Orloff (ör'löf) Diamond, The.** See DIAMOND; ORLOFF.

**Or'lop-deck**, in naval architecture, the lowest deck, consisting of a platform laid over the beams in the hold of a ship of war, whereon the cables were usually coiled, and containing also cabins and storerooms. In merchant vessels it is often a temporary deck.

**Ormazd, ör'mäzd.** See ORMUZD.

**Ormerod, ör'mě-röd, Eleanor Anne**, English entomologist: b. Sedbury Park, Gloucestershire, 11 May 1828; d. St. Albans, England, 19 July 1901. She acquired her knowledge of entomology through her own investigations, devoting herself especially to the study of injurious insects. Her advice was sought, and specimens of harmful insects were sent her from all over the world. In 1878 she was elected to a fellowship in the Meteorological Society, the first woman to be thus honored, and in 1882 was appointed honorary consulting entomologist to the Royal Agricultural Society. She published: 'Cobham Journals' (1879); 'Guide to Insect Life' (1884); 'Annual Reports of Observations on Injurious Farm Insects' (1877 et seq.); etc.

**Ormoc, ör-mök'**, Philippines, a pueblo of the island of Leyte, situated on the Bay of Ormoc, on the western coast of the island, 35 miles southwest of Tacloban. It is surrounded by a stone breastwork with three ruined forts. It has an important hemp trade. The Bay of Ormoc affords the only safe anchorage on the west coast of Leyte during typhoons. Pop. 8,200.

**Or'molu (French or moulu, "ground gold")**, in the etymological meaning of the word, ground gold leaf used as a gilt pigment; and by an extension of the term a compound of copper, zinc, and tin (sometimes called "mosaic gold"; or a paste of mercury and gold, used for gilding.

**Ormond, ör'münd, Alexander Thomas**, American philosophical writer: b. Punxsutawney, Pa., 26 April 1847. He was graduated from Princeton in 1877; was professor of philosophy and history in the University of Minnesota 1880-3; of mental science and logic at Princeton 1883-98; and McCosh professor of philosophy at the latter institution from the last named date. He has published 'Basic Concepts in Philosophy'; 'Foundations of Knowledge' (1900).

**Ormond, Duke of.** See BUTLER, JAMES.

**Ormulum**, ōr'mū-lūm, in early English literature, an English metrical translation of the Gospel history. See ENGLISH LITERATURE.

**Ormuz**, ōr'mūz, or **Hormuz**, an island in the Persian Gulf, on the north side, near its entrance. It is about 15 miles in circumference, has a rugged appearance, is entirely destitute of vegetation, has several of the high peaks white from an incrustation of salt, and abounds in iron, copper-ore, and rock-salt. Ormuz was once the emporium of all the riches of India, the receptacle for the gems of Samarkand and Bokhara, and for the manufactures of Europe and Asia. The Portuguese had possession of it from 1515 to 1622, when it was captured by the English and given to the Shah of Persia, who dismantled the city, transferring its commerce to Bender Abbas, on the opposite coast. The town of Ormuz stood on a plain on the north side of the island; and although now only a few scattered ruins, it once contained 4,000 houses.

**Ormuzd**, ōr'mūzd, or **Ormazd**, supreme deity, literally "Lord Wisdom," in the Zoroastrian religion. The word is a broken down form of the Avestan "Ahura Mazda" and the old Persian "Auramazda," and these three forms are interchangeable in modern usage. He is the good principle, who is continually at war with Ahriman, the bad principle, and the Zoroastrian conception of him was a very noble one, free from any traces of anthropomorphism and from many recollections of nature worship. The influence of this concept on Judaism and Christianity was undoubtedly great, and Ormuzd approaches closely to Jehovah as a high type of the ideal of a national religion. Consult: Darmesteter, 'Ormazd et Ahriman' (1887). See AVESTAN; ZOROASTER; ZOROASTRIANISM.

**Ornamental Grasses.** See GRASSES OF THE UNITED STATES.

**Or'nithodelphia.** See MONOTREMATA.

**Ornithologists' Union, American.** See AMERICAN ORNITHOLOGISTS' UNION.

**Ornithology**, the science which treats of birds. It is susceptible of such a broad interpretation that it is difficult to define its limits with accuracy, and of late years certain of its branches have become to such an extent matters of popular interest that we are coming to use the term "bird study" to distinguish them from purely scientific ornithology. Ornithology proper, then, may be said to treat of the classification of birds,—both the phylogeny of the group as a whole and the definition of the numerous species and varieties—which involves anatomical, morphological, embryological, and physiological investigations and studies of both the living and dead bird. Geographic distribution and migration also form an important branch of ornithology, and though the former pertains equally to other branches of zoology, as well as to botany, it has nevertheless been studied very largely from the side of the birds.

**Structure.**—Birds, being eminently aerial, the anterior pair of limbs are modified into wings, and the bones of the hand are so much reduced that portions of two digits only remain. The peculiarities of feathers and other accessories to flight are described elsewhere. See FLIGHT; PLUMAGE.

Considering other peculiarities in the general structure of birds, we find the skull bones to be united to a remarkable degree, so that almost all traces of the components are lost. In the head of the adult bird, besides the skull proper and the lower jaw, are only four separate bones, excepting the hyoids, which support the tongue. These are the two *quadrates*, which lie between the articulating surface of the lower jaw and the skull—a peculiarity of birds as compared with mammals, in which the mandibles articulate directly with the skull; and the two *pterygoids*, which connect the quadrate with the palate. The eye of birds is relatively very large, and the ear is situated rather below and behind it, but does not protrude externally and the location of the opening is not noticeable, except for the slightly different sort of feathers which usually cover it. No living birds are provided with teeth, the mandibles being covered with a horny sheath forming the bill, which has sharp cutting edges, and is wonderfully modified in form, according to the habits of the various species. The feet of birds show even a greater degree of adaptive modification than the bill, and inasmuch as these two are the only parts of a bird not covered by feathers, it is not surprising that all the older classifications were founded almost exclusively upon them. The ankle bones (as well as the bones of the wrist) are lost very early in the development of the bird, and become entirely combined with the ends of the adjoining bones, so that the so-called tarsus, a fusion of all the tarsal bones, includes, in addition, the metatarsal elements, and is more properly known as the "tarsometatarsus." The fibula in most birds is more or less reduced, the lower portion ending in a sharp point, and not reaching the end of the tibia, as is familiar to us in the "drum-stick" of the chicken. The femur and a large portion of the tibia are covered by the skin of the body so that the entire external part of the bird's leg is in reality the foot. The long "tarsus" with its usual horny covering corresponding to the flat portion of the human foot, while the bend where the feathering begins is the heel. In other words, the average bird carries its heel high up in the air and walks or grasps with the toes, which are at the other end of a very long instep. The toes themselves are never more than four,—usually one directed backward and three forward, making a grasping foot. Sometimes, however, one of the front toes is reversed, as in the woodpeckers, or all may point forward, as in some swifts. Certain woodpeckers have but three toes, while all birds which habitually walk, and most of those that swim, exhibit a great reduction or total loss of the hind toe.

The modifications in webbing and other peculiarities of foot-structure are very numerous. Most swimmers have two webs, uniting the three functional toes, while the cormorants, pelicans, etc., in which the hind toe is well developed, have three webs.

The neck of birds is usually long, the vertebrae moving easily upon one another, so as to permit great flexibility. The body-cavity is well encased by the bony structure, but owing to the length and construction of the ribs is likewise very flexible. Its most peculiar characteristic is the remarkable development of the sternum or breast-bone, which is expanded into a broad, flat

structure. Sometimes, as in the ostriches and their allies, it is smooth on the anterior surface, but in other living birds it is provided with a vertical keel. It is to this that the great flight-muscles of the breast are attached; and while the presence or absence of a keel was formerly looked upon as of primary importance in tracing the ancestry of birds, it is now regarded more as an indication of the extent to which the power of flight has been lost. On the back of the body cavity is another solid, bony structure known as the sacrum, formed by the fusion of the lower vertebrae and the pelvis. The clavicles or "collar bones" of a bird also present a peculiar appearance, being usually firmly ossified at their lower extremities, forming a V-shaped bone known as the furculum or popularly the "wish-bone."

As to the soft anatomy of birds, a characteristic avian structure is seen in the thick-walled muscular gizzard, which is a prominent feature of the stomach of all birds which devour hard substances such as grain, horny insects, etc., though practically absent in birds of prey and fish-eating species whose food is soft. All birds with well developed gizzards swallow small particles of gravel, sand, etc., which by the action of the muscular walls, grind up the food that they have swallowed and render it suitable for digestion, performing, as it were, the work of the molars or grinding teeth of mammals.

The complicated voice-organ or syrinx, comprising the lower portion of the larynx, is another organ peculiar to birds, and the arrangement and number of the muscles that contract the horny rings by which the vocal chords are controlled, have recently been found to be of fundamental importance in avian classification. This organ is only highly developed in the singing-birds (*Oscines*).

**Classification.**—Owing to the great amount of attention that has been devoted to systematic ornithology through long periods of years, we find that it is through this branch also that the "science" of nomenclature has reached its present formidable development. Although of equal importance to all systematists, it is the ornithologists who have been responsible for the earlier and the more important codes that have been formulated to govern the formation and adoption of our technical systematic names. From the time of Aristotle scientific literature has been full of attempts to classify birds. The earlier schemes naturally dealt with external characters only, and as feathers were common to all, the only available parts were the bill and feet. There were two grand divisions, Water Birds and Land Birds, while under these came the waders, swimmers, divers, etc.; the birds of prey, gallinaceous birds, *Fissirostres*, *Conirostres*, *Tenuirostres*, etc.

In 1813 Merrem proposed to separate the birds with a smooth breast-bone (ostriches, etc.) from the rest of the class—which all possess a keel on the sternum. This was an important advance, and the first recognition of the modern groups *Ratite* and *Carinate*. In 1827 a Frenchman, L'Hermier, made an extended study of the skeletal structure of birds and brought to light many points of relationship between birds hitherto regarded as distinct and *vice versa*. The cranes and herons were shown to be wrongly associated, and similarly the gulls and petrels, while the relationship between the gulls and the

plover tribe was pointed out. Thus were the long accepted groups of "waders" and "swimmers" rudely shattered, and the external resemblance in foot-structure was shown to be superficial.

The classification of birds, always a puzzle, now became still more complex, and all parts of the avian structure were investigated in the hope of reaching some set of characters that would prove the solution of the problem. The idea seemed to be then prevalent—and is still so in the minds of some systematists—that some one part of the bird's structure would furnish characters upon which a satisfactory classification could be established. Nitzsch made numerous anatomical investigations, but his most important discoveries were in connection with pterylography, showing that the number and shape of the feather-tracts differed widely in different groups. McGillivray and Müller studied the soft anatomy, and the latter was the first to divide the passerine birds into *Oscines* (singing birds) and *Clamatores*, by pointing out the difference in the number and character of the vocal muscles. Sundevall considered the physiological side of the subject and was the first to define *Altricial* and *Precocial* birds—those respectively that are hatched helpless and reared in a nest and those that run about as soon as leaving the egg. Up to this time classification meant a search for similarities with the object of arranging species in definite groups and families. In the minds of some the whole matter was one of mathematical exactness and in this connection the circular system outlined by Swainson in his 'Geography and Classification of Animals' is interesting reading. There now came a revolution in the classification of birds; as well as of other groups. In 1859 Darwin published his 'Origin of Species,' and his work, as well as that of Alfred Russel Wallace, soon put classification in a new light. It was realized that the birds of to-day are the terminal branches of a great family tree of bird-life whose trunk and early limbs are far back in the geological past, where they merged into the trunk which has produced the modern reptiles. Some of our present bird-families, notably those most numerous in species, are comparatively recent developments, suited in every way to prevailing conditions; while others, usually with few representatives, are the remnants of ancient groups which belong much farther back on the tree, and have barely survived to the present time. The significance of fossil-forms now became evident, as well as the fact that birds could not be arranged in a linear series and preserve their proper relationship. It was also clear that in tracing the phylogeny of birds all sorts of characters must be taken into consideration; since modification in one part may have been important at one time, or in one group, while in another group some other part was the seat of variation.

The principal contributors to the modern classification of birds are as follows:

Huxley in 1867 made a study of birds' skulls and demonstrated the importance of the arrangement of the bones of the palate as an aid to classification, defining the several types of palate-structure known as *dromæognathous*, *desmog-nathous*, *schizognathous* and *æthognathous*.

Garrod and Forbes made important additions to our knowledge of the muscular anatomy of birds, and in 1888 Fürbringer published probably the greatest treatise on avian phylogeny that has yet appeared. One of his most important discoveries was that of the descent of the ostriches and their allies from flying ancestors, showing them to be a degenerate and not a primitive group.

In spite of the vast amount of attention that has been given to the subject, we are still far from solving the problem of avian classification. The great rarity of fossil birds leaves gaps in the system which it is almost hopeless to expect to fill; and although ornithologists are pretty well agreed upon a number of the leading groups, their exact phylogeny will remain a matter of guesswork unless comparative embryology shall solve the problem. It is a well-known fact in zoology that the embryonic development of the individual in the main represents the paleontological development of the species; and if embryo birds had been saved and studied by oologists, instead of the empty shells of the eggs, we might to-day be much farther along on our way.

The present views of bird-classification are briefly as follows: We have two distinct branches of existing birds, the degenerate *Ratitæ* and the *Carinatae*. The former represented by four orders: 1, the Apteryxes of New Zealand; 2, the cassowaries and emus of the Australian region; 3, the rheas of South America; and 4, the ostriches of Africa and Arabia.

Among the *Carinatae* we have, first of all, the tinamous (*Crypturi*), a sharply defined group of birds recalling the gallinaceous type in external appearance, but with many points of resemblance to the *Ratitæ*. The penguins (*Sphenisci*) are a degenerate group of somewhat doubtful affinity, which Dr. Stejneger regards as differing more from any of the remaining birds than they do from each other; while other authorities place them as a distinct order, but in alliance with the loons. The latter, together with the grebes, form a natural order *Pygopodes*, while the petrels and albatrosses form another, *Tubinares*. The relationship of the auks (*Alcidae*) has been in some doubt, but they are now most frequently placed near the gulls (*Gavia*). The latter have much in common with the plover and sandpipers (*Limicolæ*), and the sheathbill (*Chionis*) is in many respects intermediate; together with the bustard (*Otididae*) they seem to form another natural order. Three other groups of "water" birds constitute well defined groups: (1) The *Anseriformes*, ducks and geese, with the outlying horned screamers (*Palamedea*) and flamingos; (2) the storks and herons; and (3) the *Seganopodes*, or totipalmate swimmers; that is, cormorants, pelicans, etc. The last-named bear affinity to the hawk-tribe (*Accipitres*), which, with the American vultures, form a distinct group, their only other alliance being a possible one with the herons through the secretary bird (*Serpentaria*). We have left the cranes (*Gruidæ*), rails (*Rallidae*), and trumpeters (*Psophiidae*), which form an order *Gruiformes*; and several very puzzling forms which are generally placed in the neighborhood of the rails, though they have no near relatives, and some, at least, are generalized forms descended from earlier branches of the family tree and consequently exhibiting characters possessed by

several distinct modern families. Such birds are the seriema, sun-bittern and kagu.

We next have the great gallinaceous assemblage, near which are placed the sand-grouse (*Pterocles*) and the pigeons (*Columba*). While that curious bird, the hoactzin, the representative of a distinct order, seems in some respects a connecting link between the gallinaceous type and the plantain-eaters (*Musophagidæ*), which stand near the cuckoos. From this point we pass to a number of groups, some of them very sharply defined, others less so; as, for instance, the woodpeckers (*Pici*), parrots (*Psittaci*), owls (*Striges*), whip-poor-wills, etc. (*Caprimulgi*), swifts (*Cypseli*), humming-birds (*Trochilæ*), etc. The complete separation of the owls from the hawks seems borne out by all modern researches, and their true position is probably in the neighborhood of the *Caprimulgi*. Last of all come the *Passeres*, divisible into two sub-orders and comprising far more species than all the other orders combined, but so hopelessly are the species interrelated that only a very few clearly circumscribed families can be distinguished, of which the swallows (*Hirundinidæ*) are one of the best. Just which species of passerine birds are the highest; that is, the most specialized, is a matter concerning which there is much difference of opinion, and the thrushes, crows and finches have each been awarded the honor.

The following scheme, slightly modified from that of Dr. H. Gadow, will show approximately the present ideas of classification. Phylogenetically we may regard the *Colymbomorpha* and *Pelagomorpha* as branches of one stock, while the *Electromorpha* came away independently. The *Coraciomorpha* have branched off from the last named, the hoactzin and the plantain-eaters representing one point of alliance. The *Ratitæ*, on the other hand, are a degenerate group probably from the same ancestry as the tinamous.

#### RATITÆ.

The Ostrich tribe and certain Fossil allies.

#### CARINATÆ.

##### *Colymbomorpha*:

- I. Sphenisciiformes,—Penguins.
- II. Colymbiformes,—Grebes and loons.
- III. Procellariiformes,—Petrels and albatrosses.

##### *Pelagomorpha*:

- I. Ciconiiformes,—1, Cormorants, etc.; 2 herons; 3, storks.
- II. Anseriformes,—1, Palamedea; 2, ducks and geese; 3, flamingos.

- III. Falconiformes,—1, Cathartæ; 2, hawks, etc.

##### *Electromorpha*:

- I. Tinamiformes,—Tinamous.
- II. Galliiformes,—1, Hemipodæ; 2, gallinæ; 3, hoactzin; 4, sand grouse; 5, pigeons.
- III. Gruiformes,—1, Sun-bitterns; 2, rails; 3, cranes; 4, trumpeters; 5, seriema.
- IV. Charadiiiformes,—1, plovers, etc.; 2, gulls and auks.

##### *Coraciomorpha*:

- I. Cuculiformes,—1, cuckoos, etc.; 2, parrots.
- II. Coraciiformes,—1 Coraciæ; 2, owls; 3, caprimulgi; 4, swifts; 5, colies; 6, trogons; 7, woodpeckers.
- III. Passeriformes,—1, Eurylamiidæ; 2, clamatrices; 3, menuridæ; 4, oscines.



The number of species of birds is enormous, and a very large portion of ornithological literature has to do with their description, a work which is still progressing; for though it is probable that nearly all the distinct forms of bird-life have been discovered and described, there is still an abundance of closely allied geographic races to be distinguished. This refinement in separation of species and "varieties" in ornithology early reached a point far in advance of that attained in any other group of vertebrates, and the effects of peculiar environment and isolation in the evolution of species was apparently first clearly recognized from the study of birds. In some countries, notably in North America, the birds have been so closely examined over large areas that it is possible to trace the exact effect of peculiar climatic conditions upon color, and parallel examples are furnished by several different types of birds. The recognition of large numbers of closely allied geographic races, while deplored by those who would keep our nomenclature within the limits of convenience, is of the greatest importance in broader scientific research. Not only are valuable data thus obtained for the study of the evolution of species in its relation to geographic distribution and environment, but by recognizing certain peculiarities, however slight, as characteristic of birds breeding in a certain district, it is possible to identify the same form in its winter quarters or *en route*; and already data are being collected in the United States which before long will throw much light upon the exact course of the migration. The recognition of these geographic races in ornithological nomenclature resulted in the adoption by many ornithologists, notably Americans, of a trinomial system instead of the binomial system of Linnaeus, and geographic forms are now denoted by a "subspecific" name attached to the generic and specific ones, as, for example, *Melospiza melodia fallax*. This very materially alters our old conception of a species, just as the theory of evolution modified the conception of orders and families, and we are now coming to recognize that species and subspecies (they differ only in degree) as we find them to-day are forms differentiated from one another in variable degree, some perfectly distinct, others so slightly as barely to be appreciable. The attempt to denote the degree of variation by any system of names is bound to express merely individual opinion, and this explains much of the constant controversy over nomenclature.

The beauty of birds has appealed to the artistic side of many men, and many early ornithologists were artists and regarded the colored plates in their books as of perhaps more importance than the text. As examples of ornithological works of this sort may be mentioned Catesby's 'Natural History of Carolina,' Wilson's 'American Ornithology,' and Bonaparte's supplement to it; the elephant folios of Audubon, and the many sumptuous works of John Gould. Of recent years the perfection of photographic apparatus has made possible the photography of living birds in all the functions of life, which has proved of great scientific value. By thus bringing together accurate pictures portraying widely scattered species we have material from which valuable deductions are likely to be made.

**Bibliography.**—General works are Gadow, Brehm's 'Thierreich' (Vögel); Newton, 'Dictionary of Birds'; British Museum, 'Catalogue of Birds'; Coues, 'Key to North American Birds'; and Cassells, the Royal, the Standard and the Cambridge 'Natural Histories,' especially Evans, 'Birds' (1900), in the last named series. Newton's 'Dictionary' (1896) contains an immense bibliography relating to systematic and faunistic ornithology. For the United States the early standard works were the 'Ornithologies' of Audubon, Wilson and Nuttall. The publication by Spencer F. Baird (1859) of the 8th volume of the 'Pacific Railway Reports,' dealing with the birds of the country in accordance with advanced knowledge, started a new epoch in the study. This was stimulated again by the publication, first in 1872, of Elliott Coues' 'Key to North American Birds,' which has since passed through many editions. The most important and latest manual is Robert Ridgway's 'Birds of North and Middle America,' begun in 1901.

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**Ornithop'oda**, a group of dinosaurs, now included in the *Orthopoda* (q.v.).

**Or'nithoryn'chus**. See DUCKBILL.

**Or'nithosau'ria**, the pterodactyls. See PTEROSAURIA.

**Or'nithoscel'ida**, a group named by Huxley to include certain genera of dinosaurs (*Iguanodon*, *Megalosaurus*, etc.), which "present a large series of modifications intermediate in structure between reptiles and birds."

**Ornithos'toma**, the generic name of a huge pterodactyl from the Cretaceous rocks of Kansas, which is probably identical with *Pteranodon*. See PTERODACTYLS.

**Or'obanch'aceæ**, the broom-rape family. The general properties of this family of plants are astringency and bitterness. The calyx is divided, persistent, inferior; the corolla hypogynous, irregular, persistent, aestivation imbricated; stamens, four; ovary free, one-celled, with two carpels; style, one; stigma two-lobed, divided transversely to the carpels; fruit capsular. The *Orobanchaceæ* are herbaceous parasites, with scales in place of leaves. They attach themselves to the roots of different plants, and have received the name of broom-rapes from the ravages they are supposed to commit among plants of the broom family. The different species attach themselves to different plants, as the *Orobanche major* to broom and furze, *O. ramosa* to hemp, *O. rubra* to thyme, *O. hedera* to ivy. The central cellular portion of the stems is surrounded by fibro-vascular bundles, which connect themselves with those of the plants to which they attach themselves. They have also tubers and ordinary roots, from which it is supposed they may derive nourishment from the soil. See CANCER-ROOT; BROOM-RAPE.

**Or'obus**. See BITTER VETCH.

**Orography**, a term applied to the study of mountains, their chain, branches, etc. The study includes the method of measuring the heights of mountains by trigonometrical survey. The great difficulty to be encountered in this method of measurement arises from the optical delusion occasioned by the different states of

the density of the atmosphere, causing a proportionate change of refraction, which may, however, be corrected by hygrometric observation. In modern times it has been usual to ascertain the heights of mountains by barometrical observation, as being much more convenient and sufficiently correct for all practical purposes. There is a proportionate relation between the height of the mercury in the barometer and the altitude of the point of observation, which may guide in ascertaining within certain limits the acclivities and declivities of any line of travel, so that by observing the rises and falls in the barometer, and noting the distances, an outline may be obtained of the profile of the tract.

**Orhip'pus.** See HORSE, EVOLUTION OF.

**Orono,** ô-rô-nô, Maine, town, Penobscot County; on the Penobscot River, and the Maine Central railroad, 7 miles northeast of Bangor. It was settled in 1774, and became a town in 1806. Its chief industry is the manufacture of lumber, and it contains a number of lumber mills, also pulp and paper mills. It is the seat of the University of Maine, including the agricultural college and the experiment station. Pop. (1910) 3,257.

**Orontes,** ô-rôn-têz, Syria, the classic name for the modern **ASIR**, or Nahr-el-Asi, a river rising on the east of the Anti-Libanus, in a natural basin of rock, the site being marked by an ancient monument. It flows north through the plain of Hamah to the Lake of Antioch, and thence southwest into the Mediterranean. Its entire course is about 200 miles.

**Orosius,** ô-rô-si-ûs, Paulus, Latin historian and theologian: b. Tarragona, Spain, about 390 A.D. He became a Christian presbyter, resided a considerable time with Saint Augustine at Hippo, and wrote at his suggestion a general history of the world, '*Adversus Paganos Historiarum Libri VII.*' to prove that the Christians were not to blame for the downfall of the Roman empire as the heathen alleged. He tries to picture the wretchedness and evils of the heathen period in as dark colors as possible, making use of the works of Livy, Tacitus, Suetonius, and other Roman writers. His history, however, is regarded by scholars as being of little value, though it long enjoyed a great popularity, and was translated into Anglo-Saxon by Alfred the Great with modifications and additions. Orosius is also said to have written a work on the errors of Priscillian and Origen, and still other writings are attributed to him. His history has been edited by Zangemeister (1882), and several English translations and editions of Alfred's translation have been published.

**Orotava,** ô-rô-tâ-vâ, Canary Islands, a town in the northwest of the island of Tenerife, formerly the capital and court of the principal kingdom of the Guanches. It is regularly built, and among its buildings are a beautiful church with three naves, and an English church. In a valley east of the town is a botanic garden. Orotava is a summer resort much frequented by European health seekers. It has an export trade in wine and cochineal.

**Orosco y Berra,** ô-rôs'kô ē bër'râ, Manuel, Mexican historian: b. City of Mexico 8 June 1816; d. there 27 Jan. 1881. He studied both

law and engineering and became editor of '*El Parvenir*' in 1846, and in 1852 was appointed director of archives. Among his published works are: '*Geografía de las lenguas y carta etnográfica de México*' (1864); and '*Historia de México*,' his most famous work (1880-1).

**Orphan Asylums, Orphanages, and Homes for Orphans,** are the terms variously applied to establishments in which orphans who have not relations able to support them are provided for and educated. The care which society at large is bound to take of destitute orphans is in many countries considered as an important point of political economy. The question of most consequence in relation to the public support of orphans, is, whether it is best, in a moral, physical, and economical point of view, to bring up large numbers of orphans in great establishments, where they live together; or to put them out singly in trustworthy families, paid by the community. In Germany this question has been long and thoroughly discussed; and it appears that the majority of persons in that country conversant with the subject prefer the plan of bringing them up in separate families. This plan has also been tried with success in Switzerland. Both systems have their inconveniences and advantages. It would appear to be cheaper, as well as better for the morals of orphans, to educate them in separate families; and in the way in which asylums have been generally conducted on the continent of Europe, the health of the children has appeared not to be so well taken care of as in families. Some asylums, however, form brilliant exceptions, as the great asylum at Potsdam, near Berlin.

**History.**—The history of the origin of orphan asylums is uncertain. What the Romans understood by *pueri et puellæ alimentarii* cannot properly be compared to our publicly supported orphans. Trajan did much in favor of orphans, and both the Antonines and Alexander Severus established foundations for them; but such institutions do not seem to have become frequent till the introduction of the Christian religion. In the Middle Ages, however, in which so many institutions beneficial to mankind originated within the walls of thriving and opulent cities, orphan asylums became frequent in such places, particularly in the larger commercial towns of the Netherlands. In Germany the first asylums are found in the free cities, yet their origin does not extend before the 16th century. One of the most famous asylums in the world is that established by A. H. Francke at Halle in 1698. There are also some considerable orphanages in Italy, and in France they are very numerous. In Great Britain there are few asylums exclusively appropriated to orphans, these being generally disposed of in poor-houses, etc.

**United States.**—In this country the orphan asylums are in the main supported as private institutions, assisted by legislative appropriation. They are fostered also by the religious denominations in almost every State. In many individual counties throughout the Union, county asylums have in late years been established. In the South there are several colored orphanages, and in New York State there is the Thomas Asylum for Orphan and Destitute Iroquois Indian Children, established on the Cattaraugus Reservation in Erie County. The care of orphans by the State had its origin in Michigan in 1871,

when the State Public School for Dependent Children was established. Since then one fourth of the States and Territories have followed Michigan's example. Following is a list of the State orphanages thus established:

State	Year Established	State	Year Established
Michigan	1871	Texas	1887
Nevada	1873	Kansas	1889
Iowa	1876	Montana	1893
Rhode Island	1884	Colorado	1895
Minnesota	1885	Nebraska	1898
Wisconsin	1886	Alabama	1899

The various States and Territories care for the orphaned children, according to the reports obtained in 1902 by the National Association of Charities and Correction, as follows:

**Alaska.**—In the care of destitute orphan children in the territory nothing has been done by the government, but various religious denominations have established homes where native orphan children are taken, fed, clothed, taught, trained, and cared for.

**Colorado.**—The government supports a State Home for Dependent and Neglected Children at Denver to which children are committed under the law, and from whence they are placed in private families under State supervision. In 1901 there was established the Cherry-tree Home Orphanage, at the Salvation Army farm in Prowers County; and the Sacred Heart Orphanage by the Sisters of Saint Francis at Pueblo.

**Connecticut.**—A temporary home is provided in each of eight counties for the care of dependent and neglected children, until suitable family homes can be found for them. There were 716 of such children in 1902. Private asylums and orphan homes cared for 1,200 children during the same year.

**Delaware.**—In this State the institutions include the Home for Friendless Children; Saint Peter's Female Orphanage and Saint James Protectory.

**District of Columbia.**—A Board of Children's Guardians in the District care for 665 children annually.

**Illinois.**—There is here a Home for Soldiers' Orphans. In Chicago there are several orphanages with 4,000 inmates; the city, however, has long been committed to the policy of placing neglected children in family homes in preference to bringing them up in an institution.

**Indiana.**—The State has a Soldiers' and Sailors' Orphans' Home, numerous private orphan asylums, and there are Boards of Children's Guardians in seven counties. In 1902 there were about 1,800 orphans in the various State institutions.

**Iowa.**—In several counties there are homes for orphans and the State controls the Iowa Soldiers' Orphans' Home at Davenport.

**Louisiana.**—The sectarian orphan asylums in this State cared for 2,037 children in 1902.

**Maine.**—There is a Temporary Home for Children in Portland, and a fast growing tendency is manifest in this State to care for orphans outside of the poor-houses, where they have been heretofore received.

**Massachusetts.**—In 1902, there were 3,500 destitute children cared for, two thirds of whom were placed in private families.

**Michigan.**—There is a State Public School at Coldwater for dependent children, the first State home of this kind established in the

United States. Since 1874 over 5,000 children from this institution have been placed in homes. Several private orphan asylums in the State care for upward of 1,000 children.

**Minnesota.**—There is a State Public School in this State which cares for 220 children annually and about 750 are housed in orphan asylums.

**Mississippi.**—There are six orphanages in this State, each in charge of a religious denomination. The Natchez Presbyterian Orphan Asylum was established in 1880. There is a Baptist orphanage at Jackson and a Waifs' Home near Biloxi.

**Montana.**—The State supports an orphan's home at Twin Bridges.

**Nebraska.**—There is a Home for the Friendless at Lincoln and a Christian Home for Children at Holdrege. The Lutherans support the Tabitha Home at Lincoln and the Episcopalian Church has a home at York. The Saint James Orphanage is located at Omaha.

**Nevada.**—The government supports a State Orphans' Home at Carson City, which was established in 1873.

**New Hampshire.**—The law provides for the removal of orphans from county almshouses within 60 days after their admission. They are mostly placed in private families.

**New York.**—There are numerous public and private orphanages in New York State, and over 40,000 children are housed in such institutions. The asylums and homes number perhaps 100, all of which are under State supervision and many of them are partially supported by legislative appropriations.

**North Carolina.**—The Orphan Asylum at Oxford has 220 inmates, and the Colored Orphan Asylum in Granville County 110 inmates. Buncombe County has a Home for Orphans supported by county funds.

**Rhode Island.**—The State Home and School for Destitute Children cares for 200 children annually. It is located at Providence.

**Texas.**—The State Orphans' Home was established at Corsicana in 1887.

**Wisconsin.**—A State Public School is maintained at Sparta with 200 inmates.

**Porto Rico.**—The island colony has a Boys' Charity School with 300 pupils and a Girls' Charity School with 200 pupils.

**State Laws.**—The law in New York State providing for the care of orphan children may be cited as what is generally the enactment in most of the States. The law provides

1. The guardianship of the person and the custody of any indigent child may be committed to any incorporated orphan asylum or other institution incorporated for the care of orphan, friendless, or destitute children, by an instrument in writing signed by the parents of such child, if both such parents shall then be living, or by the surviving parent, if either parent of such child be dead, or if either one of such parents shall have, for the period of six months then next preceding, abandoned such child, by the other of such parents, or if the father of such child shall have neglected to provide for his family during the six months then next preceding, or if such child be a bastard, by the mother of such child; or if both parents of such child shall then be dead, by the guardian of the person of such child, legally appointed, with the approval

## ORPHANS—ORPHEUS

of the court or officer which appointed such guardian to be entered of record; or if both parents of such child shall then be dead and no legal guardian of the person of such child shall have been appointed, and no guardian of such child shall have been appointed by a last will and testament, or by a deed by either parent thereof, or if the parents of such child shall have abandoned such child for the period of six months then next preceding, by the mayor of the city or by the county judge of the county in which such asylum or such other institution shall be located, upon such terms, for such time, and subject to such conditions as may be agreed upon by the parties to such written instrument. And such written instrument may provide for the absolute surrender of such child to such corporation. But no such corporation shall draw or receive money from public funds for the support of any such child committed under the provision of this section, unless it shall have been determined by a court of competent jurisdiction that such child has no relative, parent, or guardian living, or that such relative, parent, or guardian, if living, is destitute and actually unable to contribute to the support of such child.

2. It shall not be lawful for any county superintendent or overseer of the poor, board of charity, or other officer, to send any child between the ages of 2 and 16 years, as a pauper, to any county poor-house or alms-house for support and care, or to detain any child between the ages of 2 and 16 years in such poor-house or alms-house; but such county superintendents, overseers of the poor, boards of charities, or other officers shall provide for such child or children, in families, orphan asylums, hospitals, or other appropriate institutions, as provided by law. The boards of supervisors of the several counties of the State are directed to take such action in the matter as may be necessary to carry out the provisions of this section. When any such child shall be so provided for or placed in any orphan asylum or such other institution, such child shall, when practicable, be so provided for or placed in such asylum or such institution as shall then be controlled by persons of the same religious faith as the parents of such child.

3. All institutions, public or private, incorporated or not incorporated, for the reception of minors, whether as orphan or as pauper, indigent, destitute, vagrant, disorderly, or delinquent persons, are required to provide and keep a record in which shall be entered the date of reception, and the names and places of birth and residence, as nearly as the same can reasonably be ascertained, of all children admitted in such institutions, and how and by whom and for what cause such children shall be placed therein, and the names, residence, birthplace, and religious denomination of the parents of such children so admitted, as nearly as the same can be reasonably ascertained; and whenever any such child shall leave such institution, the proper entry shall be made in such record, showing in what manner such child shall have been disposed of, and if apprenticed to or adopted by any person or family, or otherwise placed out at service or on trial, the name and place of residence of the person or head of the family to or with whom such child shall have been so ap-

prenticed, adopted, or otherwise placed out. The Supreme Court may, upon application by a parent, relative, or legal guardian of such child, after due notice to the institution and hearing had thereon, by order direct the officers of such institution to furnish such parent, relative, or legal guardian with such extracts from such record relating to such child as such court may deem proper.

4. While any child which shall have been placed in such asylum, or other institution, as a pauper, in pursuance of the second section of this act, shall remain therein at the expense of the county or town to which such pauper child is chargeable, the superintendents of the poor of such county, or the overseer of the poor of such town, may, in their discretion, remove such child from such asylum or other institution and place such child in some other such institution or make such other disposition of such child as shall then be provided by law. The name of no child shall be changed while in such institution as in this section aforesaid. But no parent of such pauper child, so in such asylum or other institution as in this section aforesaid, shall be entitled to the custody thereof except in pursuance of a judgment or order of a court or judicial officer of competent jurisdiction, adjudging or determining that the interests of such child will be promoted thereby, and that such parent is fit, competent, and able to duly maintain, support, and educate such child.

5. Any corporation specified in the first section of this act may bind out any indigent or pauper child, if a male, for a period which shall not be beyond his 21st year, and if a female, for a period which shall not be beyond her 18th year, which shall have been absolutely surrendered to the care and custody of such corporation in pursuance of the provisions of the first section of this act, or which shall have been placed therein as a pauper in pursuance of the provisions of the second section of this act, or which shall have been left to the care of such corporation with no provision by the parent, relative, or legal guardian of such child, for its support for a period of one year then next preceding, to be a clerk, apprentice, or servant.

6. Any child which a corporation specified in the first section of this act is, by the fifth section of this act, authorized to bind out, may be placed by such corporation, by adoption. See FOUNDLING.

Consult Annual Reports, 'Conference of Charities and Correction.'

WILL M. CLEMENS,  
Editorial Staff, 'Encyclopedia Americana.'

**Orphans' Court**, in Pennsylvania and a few other States, where it occupies a position similar to that of the surrogate; devoted largely to probate matters, such as the granting of letters of administration; to take proof of wills and to direct and control estates and the settlement of accounts of executors and administrators. See also COURT.

**Orpheus**, *ôr'fûs*, in Greek mythology, an important personage, surrounded by a multitude of legends, which invariably associate him with Apollo and the Muses. To him is attributed the application of music to the worship of the gods. Apollo presented him with his lyre, and the Muses instructed him to use it, so that he

moved not the beasts only, but the woods and rocks with its melody. Having lost his wife Eurydice by the bite of a serpent he descended to Hades to try and get her back. His music so moved the infernal deities Pluto and Proserpine that they consented to her return to earth, only her husband, whom she was to follow, must not look back till they had reached the upper world. This condition the impatient Orpheus violated and lost his wife forever. He is said to have met his death at the hands of a band of furious women engaged in the mystic rites of Bacchus. He is represented as one of the Argonauts, and to him is ascribed the origin of the so-called Orphic mysteries connected with the worship of Bacchus. The bulk of the poems attributed to Orpheus in modern times have been proved to be forgeries of Christian grammarians of the Alexandrian school. A portion of them, however, belong to the time of Onomacritus, or earlier, and include hymns, a theogony, a poem called 'Minyas, or the Descent Into Hades'; oracles and songs for initiation, and sacred legends. Among those who have investigated the Orphic writings are Ottfried Müller, Grote, and Lobeck. See also APOLLO; BACCHUS; EURYDICE; MUSES.

**Orpheus C. Kerr**, the pseudonym of ROBERT HENRY NEWELL (q.v.).

**Orpiment**, the native mineral, yellow sulphide of arsenic, As<sub>2</sub>S<sub>3</sub>. It forms rhombic trimetric prisms of translucent lemon-yellow color. Its specific gravity is 3.45. It is very poisonous. It was formerly used as a pigment and was known as king's yellow.

**Orpine**, or **Live-forever**, a perennial herb (*Sedum telephium*) of the natural order *Crasulaceae*. It is a native of Europe and northern Asia, whence it has been introduced in cool climates throughout the civilized world. In the United States and Canada it is of frequent occurrence among rocks and in sandy, dry and poor soils, often being the only herbage in such places. Though it produces few blossoms it spreads rapidly by means of its roots. Thrifty specimens attain heights of 15 to 18 inches, bear obtuse, heart-shaped toothed, fleshy leaves, and pink or sometimes white flowers in dense rounded cymes, both terminal and lateral. Several horticultural varieties are used in rock-gardens and places where little attention is required or can be given.

**Orr**, ôr, **Hugh**, American inventor: b. Lochwinnoch, Renfrewshire, Scotland, 13 Jan. 1717; d. Bridgewater, Mass., 6 Dec. 1798. He came to America in 1737 and settled at Bridgewater, where he began work as a gunsmith and manufactured edged tools. In 1753 he invented a machine for dressing flax, and his other inventions were many. He was an ardent patriot in the Revolutionary War, and erected a foundry where he cast cannon and shot for the army.

**Orr**, **James**, Scottish theologian: b. Glasgow 11 April 1844. He was educated at Glasgow University and the Theological Hall of the United Presbyterian Church. He entered the ministry and was pastor of East Bank United Presbyterian Church, Hawick 1874-91; in 1895 lectured in Chicago on German theology, and in 1897 lectured on the Elliot and Morgan foundations at Allegheny, Pa., and Auburn, N. Y. He

was also professor of church history in the United Presbyterian Theological College, Scotland, 1891-1901. He has published: 'The Pulpit Commentary' (1891); 'The Christian View of God and the World' (1893); 'The Supernatural in Christianity' (1894); 'Early Church History and Literature' (1901); 'The Progress of Dogma' (1902); etc.

**Orr**, **James Lawrence**, American legislator: b. Claytonville, S. C., 12 May 1822; d. Saint Petersburg, Russia, 5 May 1873. He was graduated from the University of Virginia in 1842, admitted to the bar in 1843, and established a law practice in Anderson, S. C., also editing the Anderson 'Gazette.' He was elected to the State legislature in 1842, served two terms, and in 1848-59 was a member of Congress, officiating as speaker of the House in the 33d Congress. A strong opponent of secession, he opposed it as long as possible, and then followed the lead of his native State. He commanded one of the first Confederate regiments raised in South Carolina, but in 1862 entered the Confederate senate, of which he was a member until the close of the war. He was the first governor of South Carolina after the restoration of her rights as a State of the Union, serving from 1866-8, and in 1872 was appointed minister to Russia, where he died in the following year.

**Orrery**, ôr'ê-rî, **Earls of**. See BOYLE.

**Orrery**, in astronomy, a machine for representing the motions of the planetary bodies. Distinct names have been given to various modifications of it: the planetarium, which exhibits the orbital paths of the planets and their satellites; the tellurium, which shows the motions of the earth causing day and night, the seasons, and the variable length of the former as dependent upon the latter; the lunarium, which shows the motions of the moon; and the satellite machine, chiefly intended to represent the motions of Jupiter and his satellites. The ordinary orrery was invented by George Graham about 1700, and first patronized by the Earl of Orrery. Steele, probably supposing the earl to be the first promoter if not the inventor of it, called it by his name. The contrivance is useful rather in aiding the conceptions than in elucidating truths; but it is mischievously faulty owing to the impracticability of representing in model anything like the proportions subsisting among the planetary bodies.

**Orris Root**, the rhizome or underground stem of a white flowering species of iris, the *I. Florentina*, a native of the south of Europe. In a dried state it is well known on account of its communicating a grateful odor, resembling that of violets. It was formerly much employed in medicine, but is now little valued except as a perfume. It is exported from the Mediterranean in considerable quantities, and, among other uses, is employed in the manufacture of tooth powder. Compare IRIS.

**Orsini**, ôr-sê'nê, Italian noble family dating back to the 10th century. In the 11th century the Piedmont branch were prominent among the members of the Guelph party, even opposing Frederick Barbarossa. But the Roman branch is better known, especially for its rivalry with the Colonna family, beginning at the close of the 13th century; the first great name in this

branch is Nicholas III., who was pope from 1277 to 1280. Even in the city of Rome the Orsini built strong fortresses, thanks to the connivance of Eugene IV., one of them covering the site of the Marcellus Theatre. They boldly opposed the attempt of Henry IV. to assert his power in Rome, and the most notable part of their struggle with the Ghibelline Colonnas was the mad and unrestrained fighting of 1333-5, which by its abuses paved the way for the brief Roman republic under Cola da Rienzi. The important members of the next centuries were: VIRGINIO: d. 18 Jan. 1497, a famous condottiere, who fought for the pope, then for the king of Naples, and finally for Charles VIII.; NICCOLO, count of Petigliano: b. 1442; d. 1510; head of the Angevin party, and later leader of the Venetians against the League of Cambrai; VINCENZO MARIA, who became Pope Benedict XIII. (q.v.) in 1724; and FULVIO ORSINI (1520-1600), an antiquarian and author of 'Familie Romanæ' (1577).

**Orsini, Felice**, fā-lé'chā, Italian revolutionist: b. Meldola December 1819; d. Paris 13 March 1858. He studied at Imola and Boulogne, took part in several plots against the pontifical government, was condemned to the galleys for life at 25, was pardoned by Pius IX., became a leader of the rising of 1848, and after the fall of the republic engaged in several unsuccessful plots. He was arrested and imprisoned in 1855, escaped to England, where he made a living as a lecturer on the papacy, and as the author of 'Austrian Dungeons in Italy' and 'Memoirs and Adventures' (1857). Hoping that the death of Napoleon III. would be followed by a general Italian rising, he made his way to Paris in December 1857, and 14 Jan. 1858, with his two accomplices, threw three bombs at the emperor and empress in the Opéra. Many were killed by the explosions, but Napoleon and Eugénie were unhurt. Orsini was executed with one of his accomplices, the other being pardoned at the emperor's request.

**Orsova**, ōr'shō-vō, Hungary, a frontier town on both banks of the Cerna at its confluence with the Danube, near the Vaskapu or Iron Gates, 92 miles east of Belgrade. OLD ORSOVA, the Roman Tierna, on the west bank of the Cerna, has a modern harbor, is a station for the Danube steamers, and an important railway junction. Pop. about 4,610. NEW ORSOVA (pop. about 3,500), on the Rumanian side, is a fortified town held by Austria since 1878, who also were masters of it between 1716 and 1738; the Turks held it both before 1716 and after 1738. In 1890-6 a costly canal and other works were made for facilitating navigation at the rocky bend called the Iron Gates.

**Ortegal**, ōr'tē-gāl (Sp. ōr-tā-gāl'), Cape. See CAPE ORTEGAL.

**Orth, ōrth, Bertrand**, Canadian Roman Catholic prelate: b. Rhine Province, Prussia, 5 Dec. 1848. He received a theological education at the American College in Louvain, Belgium, and was ordained in 1872, when he was sent to Oregon as missionary to the Indians. He remained in that position until 1890, when he was appointed United States post chaplain at Camp Harney. In addition to his missionary work he has edited the 'Catholic Sentinel' of Portland and taught in various Catholic colleges.

In 1900 he was consecrated bishop of Vancouver Island, and in 1903 was elevated to the archbishopric.

**Orth, Godlove Stoner**, American legislator: b. near Lebanon, Pa., 22 April 1817; d. Lafayette, Ind., 16 Dec. 1882. He was graduated from the Pennsylvania College at Gettysburg, admitted to the bar in 1839, and began his law practice in Lafayette, Ind., where he at once interested himself in politics. In 1843-50 he was a member of the State senate, and in 1861 was appointed one of the five commissioners to consider the possibilities of a peaceful solution of the impending troubles. His sympathies were on the Union side, and after a brief term of military service he was elected to Congress in 1862-6; he supported the policy of President Lincoln, was re-elected to the 43d, 45th, and 47th Congresses, and in 1875 was appointed minister to Vienna.

**Orthis**, a large genus of palæozoic brachiopods, typical of the strophomenaceous family *Orthida*, which lived in such abundance and variety from the Ordovician to the Carboniferous periods that they are known from all over the world and the Ordovician and Silurian formations alone have yielded no less than 400 species. American specialists, it should be said, subdivide the genus into a dozen or more subgenera. The orthids have a shell, squarish in outline, with the surface covered with radiating striae or costae. The valves more or less convex; the small or dorsal valves, sometimes nearly flat or slightly concave. A distinguishing feature of the genus is that the well-developed hinged area is usually divided by a large open delthyria. A deltidium is developed only in younger growth stages. Consult: Zittel-Eastman, 'Text-book of Palæontology' (1900).

**Orthite**, natural hydrated silicate of aluminum, with long, straight prismatic crystals (hence its name), which occur in feldspar. Its specific gravity is between 3.37 and 3.8, its hardness between 5 and 6. Orthite occurs in granite, gneiss, syenite, and other rocks; usually is of a brownish or yellowish color, and contains many rare elements, such as cerium, lanthanum, yttrium, and didymium. It is found in the Urals and in Sweden, Norway, and Greenland.

**Orthoceras**, ōr-thōs'ē-ras, a genus of fossil cephalopods, allied to the nautilus, having straight, tapering, smooth-chambered shells, with the siphuncle central, which occur from the Silurian to the Trias. It forms the type of a family *Orthoceratida*, some of the species of which must have been more than six feet long and one foot wide. Related groups had shells curved in various degrees, thus approaching the coiled nautilus form.

**Orthoclase**, a variety of feldspar, called common or potash feldspar, owing its scientific name to the rectangular cleavage of its crystals; it is a silicate of aluminum and potassium, with the general formula  $K_2Al_2O_6Si$ ; and, occasionally has some sodium in place of the potassium. The percentage of silica is usually 65, and of potash about 12. The color is white or green, sometimes rose or yellowish; its specific gravity is 2.53 to 2.59; and its hardness 6. It is unaffected by acids, save hydrofluoric; but is de-



composed by water containing carbonic acid, the alkali being removed and clays being formed.

**Orthography.** See SPELLING.

**Orthopædics** (Greek, *ortho*, straight, + *pædis*, child), a branch of medical science relating to the cure of natural deformities; not, as the name implies, restricted to children, although childhood is usually favorable to treatment. The practice of orthopædics includes prophylactic or preventive treatment and curative treatment. The object of the first is to prevent deformities in children who, from the delicacy of their constitution, are exposed to them. Its means are hygienic; and its aim is to aid by natural means the symmetrical development of the body. Among these means one of the most important is pure air. Children have been known to recover from an incipient deformity of the spine or members merely by being sent to the country. The compressed-air bath has been used with success as an auxiliary in this branch of treatment. Muscular exercise methodically applied is another resource of great importance. It has the advantage not only of developing the muscles, but of aiding digestion and secretion. Treatment by curative orthopædics has been applied with success to a great variety of malformations both of the spine and members. The manufacture of apparatus for the mechanical treatment of deformities has become a distinct branch of business, and there are in various countries numerous institutions where such treatment is systematically given. See BOW LEGS; CLUB-FOOT; DEFORMITIES; JOINT; POTT'S DISEASE.

**Orthophosphoric Acid.** See PHOSPHORIC ACID.

**Orthopoda**, an order of herbivorous dinosaurs (q.v.), in the classification of Gadow, which includes as subordinate groups the plantigrade *Stegosauri* and the digitigrade *Ornithopoda* of Marsh. The group-characters are anatomical, especially those of the pelvis, which are very bird-like, and of the jaws, the premaxilla having no teeth. Consult: Gadow, 'Amphibia and Reptiles' (1901).

**Orthoptera**, or straight-winged insects, one of the Linnean orders of *Hexapoda*, which has undergone least change in the hands of modern systematists. The three regions of the body are distinct; the head is large with strong, biting jaws, and long or short filiform antennæ; the prothorax is usually greatly developed, and may form a shield partly covering the mesothorax; and the abdomen is usually full and terminated by a pair of claspers in the male and a more or less prominent ovipositor in the female. The anterior pair of wings are of little use in flight, but they are thickened and serve as covers to protect the broad, membranous, netted-veined hind wings, which, when not in use, are folded longitudinally like fans and concealed beneath the covers. In some genera wings are absent. Being of terrestrial habits and seldom flying far, the legs are well developed for running, leaping, or, as in the mole-cricket, for burrowing. There is a gradual change without any sudden metamorphosis from the larva to the imago, the pupa being active and differing from the adult only in the undeveloped wings and reproductive organs; nor do the larvæ differ greatly in appearance. The eggs are usually

laid on the ground and sometimes, as with the grasshoppers, in nests or cells. With the striking exception of the mantids, almost all of the species are strictly herbivorous and among them are some of the most serious pests with which the husbandman has to contend. One characteristic of this group is the presence of sound-producing structures, by means of which, in some families by rubbing, in others by concussion, or by a combination of both methods, are produced the noises familiar to us as the "chirping" of crickets (q.v.), the "calling" of katydids, "whirring" of grasshoppers, etc. Examples of how such sounds are made are furnished by the locusts and grasshoppers, which produce sounds in several ways. Certain species rub the inner surface of the hind femora, upon which there is a row of minute spines, against the outer surface of the fore wing. In this case each fore wing serves as a fiddle and each hind leg as a fiddle-bow. Second, other species rub together the upper surface of the front edge of the hind wings and the under surface of the fore wings. This is done while the locust is flying, and the result is a crackling sound. Third, the males of the different kinds of true grasshoppers, including the katydids, are provided with an elaborate musical apparatus, by means of which they call their mates. This consists of a peculiar arrangement of the veins and cells of a portion of each fore wing near its base. This arrangement differs in the different species, but in each it is such that by rubbing the fore wings together they are made to vibrate, and thus produce the sound. The principal families are the *Blattida*, or roaches, the *Phasmida*, or walking-sticks, the *Mantida*, or praying insects, the *Gryllida*, or crickets and mole-cricket, the *Locustida*, or locusts and the *Acridida*, or crickets, all of which are elsewhere described. Consult the 'Text-books' of Comstock, Packard, Carpenter, and others; and Howard, 'The Insect-book' (1901), which contains an extensive bibliography of the group.

**Ortler-Spitze**, *Ortler-spit'se*, or **Ortler**, Austria, a mountain in the Tyrol, on the borders of the Engadin, 70 miles southwest of Innsbruck. It is about 12,800 feet high, and the loftiest peak in Austria. The summit commanding one of the most extensive views in the Rhetian Alps was first ascended in 1802.

**Ortolan**, a European yellowish-brown bunting (*Emberiza hortulana*) famous as a dainty. It is migratory, spreading over northern Europe in summer to breed, and making its nest in bushes or small trees, and singing pleasantly. Toward autumn, when it begins to migrate southward, it is plump, and regarded as excellent eating. These birds are caught in great numbers at that season along the shores of Italy and the eastern Mediterranean, and are kept in confinement and fed for some time until they become exceedingly fat and delicate, and form a table luxury. The favorite method of preparing the ortolans for table consists in roasting them in egg shells—a mode of cookery borrowed from the ancients, among whom these birds brought very high prices. In former times the Island of Cyprus formed a chief depot for the exportation of these birds, which were pickled in spices and vinegar and packed in casks containing from 300 to 400 each. From

400 to 500 casks are annually exported from Cyprus.

**Orton, ôr'tôn, Edward**, American educator and geologist: b. Deposit, N. Y., 9 March 1829; d. Columbus, Ohio, 16 Oct. 1899. He was graduated from Hamilton College in 1848, and later studied at Andover and at Harvard. In 1856-65 he occupied the chair of natural science at the Albany State Normal School, accepting in the latter year the same chair at Antioch College, Yellow Springs, Ohio, where in 1873 he was elected president. In that year he was called to the presidency of the newly founded Ohio State Agricultural and Mechanical College, which has since become the Ohio State University. His university work was of great value, as he was a natural teacher and organizer in addition to his scholastic attainments. He was assistant on the geological survey of Ohio in 1869-75, and in 1881 was appointed State geologist, which position he filled until his death, and he frequently served on United States geological surveys. He resigned his presidency of the college in 1881, but continued to fill the chair of geology during his life. Among his works are: 'Economic Geology of Ohio' (1883-8); 'Petroleum and Inflammable Gas' (1887); etc.

**Orton, James**, American Congregational clergyman, naturalist, and traveler: b. Seneca Falls, N. Y., 21 April 1830; d. on Lake Titicaca, Peru, 25 Sept. 1877. He was graduated from Williams College in 1855, pursued theological studies at Andover and entered the ministry in 1860. He was a professor of natural science in Rochester University in 1866 and the next year conducted an exploring expedition across South America. He was professor of natural history in Vassar College 1869-73, and at the time of his death was attached to an exploring expedition in Peru. His works include: 'The Andes and the Amazon' (1870); 'Underground Treasures' (1872); 'Liberal Education of Women' (1873); 'Comparative Zoology' (1875).

**Or'tygan**. See **BUTTON-QUAIL**.

**Oruro, ô-roo'rô**, Bolivia, a department lying in the western part, bounded on the west by Chile, on the south by the department of Potosi, and on the north by the department of La Paz; area, 21,350 square miles. The Andes Mountains follow the western boundary, and the Cordillera Real the eastern; the department lies in the Titicaca basin. The surface is mostly an elevated plateau, rarely sinking below the level of 12,000 feet; the salt lake of Allugas is situated in the eastern part. There are numerous marshes and saline plains, the soil in general is unfitted for agriculture, and the climate is cold. There is considerable mineral wealth, particularly in tin, silver, and copper, and mining is the chief and most profitable industry; cattle are also raised in some sections. Pop. about 130,000, of which a considerable portion are Indians.

**Oruro**, Bolivia, city, capital of the department of Oruro; within four miles to the east of the Desaguadero River; 125 miles southeast of La Paz. It is on a plain over 12,000 feet above sea-level, about 10 miles north of Lake Allugas. It was founded in 1590, and during the 17th century was very prosperous, owing to the mines in the vicinity, having at that time over

70,000 inhabitants. Later the mines were abandoned, the population declined rapidly, and a portion of the city fell into ruins. During the last decade of the 19th century, a railroad connecting it with Antofagasta, Chile, has been the means of reviving its prosperity to a certain extent. Tin is mined in the vicinity, and considerable quantities of tin, as well as copper and silver, are exported. Pop. (estimated) 15,000.

**Orvieto, ôr-vê-â'tô**, Italy, a city and episcopal see in the province of Perugia, Umbria, 78 miles by rail northwest of Rome. It is built on an isolated tufa rock, 1,327 feet above sea level, and 765 feet above the junction of the Paglia and Chiana, is surrounded by mediæval walls, and is reached from the railroad depot by a funicular or inclined railway. The cruciform cathedral (1290-1580), one of the most beautiful and richly adorned specimens of Italian Gothic, is built of black and white marble, and measures 295 feet by 109. The façade is unsurpassed in richness of material, and in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior also is magnificently decorated with sculptures and with paintings by Luca Signorelli, Fra Angelico, etc. Two other churches of the 11th century, the bishop's palace, the Jesuit College, St. Patrick's Well (1527-1540), with its 250 steps, and the palaces Petrucci and Gualtieri deserve special notice, the former for its fine collection of paintings, and the latter for its cartoons by Domenichino, Annibale Caracci, and other eminent masters. Orvieto, called in the 7th century A.D. *Urbs Vetus* — of which its present name is a corruption — is supposed to occupy the site of the Etruscan *Volsinii*. It was created an episcopal see in 509 A.D., and in the Middle Ages it gave shelter to 32 popes; the papal palace converted into a municipal museum in 1898, has numerous interesting local antiquities, including the contents of an Etruscan necropolis discovered on the east side of the town in 1874. Pop. with suburbs about 20,000.

**Oryx**, a genus of antelopes represented by the addax, Beatrix antelope, beisa, and other species, found chiefly in northern Africa. The gemsbok of southern and central Africa is another ally. These antelopes are of comparatively large size. The horns are very long, curved, and ringed. These form powerful and effective weapons for defense, and a wounded oryx is a dangerous animal for a man to approach. Their desert habitat is indicated by the prevalent reddish-white uniform tint of their coats, almost the only distinguishing color-marks being upon the face. These antelopes are now greatly reduced in numbers, and some of the northern species are nearly extinct. One or another species is often depicted upon the monuments and mural paintings of ancient Egypt, most frequently, probably, the beisa (q.v.).

**Os, Gregorius Jacobus Johannes, van**, Dutch painter: b. The Hague 20 Nov. 1782; d. Paris, France, 11 July 1861. After taking a prize at Amsterdam (1809) and being awarded a gold medal at Paris (1812) he accepted employment as a designer and enamel painter at the porcelain manufactory at Sevres. He was eminently successful in the portrayal of flowers, fruit, and other still-life, but he also produced several landscapes. He was known among his French admirers as the 'Rubens of flower paint-

ing." So great was his scientific accuracy in drawing plants that he was engaged to furnish most of the illustrations in the 'Flora Batava.'

**Os, Jan, van,** Dutch painter (father of the preceding): b. Middelharnis, Holland, 1744; d. The Hague 1808. His studio was at The Hague throughout his artistic career; here he was director of the Académie des Belles Lettres, being a poet as well as a painter of flowers, fruits, landscapes, marines, and animals. His flowers are inferior to those of Van Huysum, whom he made his model, but his works are to be found in all important collections, and a picture of his entitled 'Flowers in a Vase, with a Cat on the Table' sold in 1883 for \$1,217.

**Os, Pieter Gerardus, van,** Dutch painter, son of the preceding: b. The Hague 1776; d. there 1830. Although he was trained in art by his father, the flower painter, he made Paul Potter his model, and painted many famous landscapes with cattle in the foreground, and his works were eagerly sought by connoisseurs from all parts of Europe. After serving in the campaign of 1813-14 he produced several battle scenes, some of which are in the Museum at Amsterdam. He was also an excellent etcher.

**Osage, ô-sâj or ô-sâj',** Iowa, city, county-seat of Mitchell County; on the Red Cedar River, and on the Great Western and the Illinois Central R.R.'s; about 95 miles in direct line northeast of Fort Dodge. It is the commercial and industrial centre of a large productive agricultural region in which there are extensive dairy, nursery, and stock-raising industries. It is the seat of the Cedar Valley Seminary, and it has the Sage Public Library. The city owns and operates the waterworks. Pop. (est.) 3,100.

**Osage,** a river which has its rise in the eastern part of Kansas and enters the State of Missouri at Bates County, flows east and north-east, and joins the Missouri River about 10 miles below Jefferson City. It is about 495 miles long, and navigable, part of the year, 200 miles from the Missouri. It is a winding stream with many deep curves of nearly parallel sides.

**Osages,** a tribe of North American Indians of Siouan origin, now as the Osage Nation occupying a reservation in northeast Oklahoma on the east bank of the Arkansas River. In the 17th century they were inhabiting an extensive region between the Arkansas and Missouri rivers, and were early allies of the French, distrusted by, and in frequent warfare with, the neighboring Cherokee, Chickasaw, Creek, Choctaw, and other Indians. The Osage Nation is said to be the richest community in the world. They own nearly 1,500,000 acres of land, worth not less than \$10 an acre. Besides this they have in the United States Treasury nearly \$8,000,000, derived since 1808 mainly from the judicious sale of superfluous lands, and drawing interest at the rate of 7 per cent. Each Osage Indian, man, woman and child, is worth at least \$15,000, and each family on a division would possess on an average \$60,000. The property is held and owned in common, and all their industries are nationalized. Their prosperity, however, has led to decadence and they are fast diminishing in numbers. From over 7,000 at the commencement of the 19th century they numbered in 1901, 1,790.

**Osage Orange** (*Toxylon pomiferum*) a tree of the order of *Urticaceæ*, growing wild in the southwestern parts of the United States. It was first found near a village of the Osage Indians, which fact, connected with the globular form and golden color of its fruit, originated its popular name, but it has no botanical relationship to the true orange. The Osage orange, also called bow-wood (by French-American writers bois d'arc) and yellowwood is a striking and beautiful lactescent tree, growing 30 or 40 feet high; its foliage is not unlike that of the orange tree, but more glossy and polished and of a bright green color. Its branches spread widely into a broad head; its flowers are dioecious, small, pale yellowish green; the barren are about 12 in number, borne in a very short, almost sessile, racemose panicle. The fruit has about the size and appearance of a large orange, yellow when ripe and roughened on the outside, containing a mucilaginous fluid, insipid and uneatable. The sap of the young wood and leaves is milky, and contains a large proportion of caoutchouc; the color of the wood is a bright yellow; its grain is fine and elastic, on account of which property it is employed by the southern Indians for bows. The young branches, beset with sharp, straight thorns, have suggested the employment of the tree for making live hedges, which succeed admirably where the winters are not so severe as to kill the annual growth. Treated as a hedge plant, it has many excellent characters but in order to form a compact growth, two shearings in a season are requisite. It is easily cultivated and propagated, and pieces of the root planted out in the nursery, with the tips just exposed above the earth, will readily grow; seeds procured from fertile trees may be sown in broad drills, a quart of seed producing at least 5,000 plants. The bark affords a strong fibre of a flaxy character and the bark of the root is used by the country-people of the Southern States as the material for a yellow dye.

**Osaka, ô-sâ'kâ, or Osaka,** Japan, the second largest city of the empire, and one of the three imperial cities, on the island of Hondo, at the mouth of the Yodo in the Gulf of Osaka, 20 miles by rail southeast of Kobe, and 27 miles southwest of Kioto. It is of great commercial and industrial importance, and has been likened to Chicago, on account of its progressiveness and modernization, to Glasgow for its industry and thrift, and to Venice for its beauty and quaintness. The city covering an area of 27 square miles lies upon either bank of the River Yodo and upon an island in the middle of the river; the many intersecting canals and the bridges (over 1,000) spanning these give the Venetian effect. The rich business and manufacturing section on the south bank of the river is Chicago, and the western quarter, monopolized by the shipping interests, is Glasgow. The island in the midst, which is the heart of the city, bears the poetical name of Nakanoshima, while anciently Osaka itself was known as Naniwa, meaning "dashing waves."

In the upper town, the fine castle, the stones of its walls of astonishing size, was constructed by Hideyoshi's orders in 1583, and the palace, built afterward in its precincts and destroyed in the civil war of 1868, was perhaps the most magnificent structure in Japan. Another notable edifice is the Sumiyoshi temple founded by the

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consort of the 14th emperor. The fine modern harbor protected by a mole has a depth of 28 feet at low water, and hundreds of steamers and sailing craft ply between its wharves and the ports of Formosa, Korea, and China. Cotton spinning is the principal of its numerous manufacturing industries; in 1903 there were fourteen cotton mills, employing 20,000 operatives—three fourths of them women and girls; other important manufactures are those of iron and steel products, glass, boots and shoes, chemicals, matches, tobacco, and clocks; shipbuilding is also a considerable industry. The foreign settlement is on the deltaic island of Kawaguchi. Osaka was opened to foreign trade and residence in 1868. Pop. of city about 850,000, with suburbs, 1,311,900.

**Osawatomie**, ős-a-wôt'ô-mě, Kan., city in Miami County near the Osage and Pottawatomie rivers, and on the Missouri Pacific railroad. Its name comes from the two rivers mentioned. It is in a stock-raising and agricultural section, and in a natural gas belt. A few settlers were in this section about 1850, but in 1855 the place was organized by the Emigrant Aid Society as a "free-State" settlement. John Brown (q.v.) was interested in this settlement, and for a time lived on a farm nearby. On 30 Aug. 1856 the town was attacked by a band of pro-slavery sympathizers; John Brown and his friends made a vigorous resistance, but were finally overcome. The city is the division headquarters for the Missouri Pacific railroad, and has the railroad shops, machine-shops, flour mills, and large stock yards. It is the seat of the State Insane Hospital opened in 1866, which has over 1,000 patients each year. Some of the prominent buildings are the city library, city-hall, the Agnew Opera House, a Masonic temple, the churches, and schools. The charter of 1883, revised in 1890, provides for a mayor and council who appoint or elect the administrative officials. Pop. 4,400.

**Os'bon, Bradley S.**, American naval officer: b. Rye, N. Y., 16 Aug. 1828. He went to sea at 10, and served in the Chinese navy as coxswain, in the Argentine navy as commander, and was an admiral in the Mexican navy. In the Civil War he served under Du Pont, Worden and Farragut, receiving honorable mention by the latter. As volunteer naval scout in the Spanish-American war he was the first to discover the proximity of Cervera's fleet off Cuaçoa, 14 May 1898, for which he received the thanks of the government. He has since served in the Arctic and Antarctic oceans and in 1900 he became flag-officer commanding the United States Veteran Navy with the rank of commodore. He has published: 'Osbon's Hand Book U. S. Navy' (1864); and 'U. S. Veteran Navy List' (1900).

**Osborn, Henry Fairfield**, American palæontologist: b. Connecticut 1857. He graduated from Princeton University in 1877 and in 1880 was assistant professor of anatomy there; later became professor of zoology at Columbia University and on 4 Dec. 1906 secretary of Smithsonian Institution. He is vice-president of the American Museum of Natural History, and since 1900 has been palæontologist of the United States Geological Survey. He has published:

'From the Greeks to Darwin' (1894); numerous scientific papers, addresses, etc.

**Osborn, Herbert**, American biologist: b. Lafayette, Wis., 19 March 1856. He was educated at Iowa State College and was professor of zoology and entomology there 1880-98. Since July 1898 he has been state entomologist of Iowa, and has filled the chair of zoology and entomology at the Ohio State University. Among his professional writings are: 'Peduculi and Mallophaga of Man and the Lower Animals' (1891); 'Insects Affecting Domestic Animals' (1896); 'The Hessian Fly in the United States' (1898); 'The Genus Scaphoideus' (1900).

**Osborn, Laughton**, American poet: b. New York 1809; d. there 12 Dec. 1878. He was graduated from Columbia in 1827, devoted his attention chiefly to literature, but was also an amateur musician and painter of good ability. His verses in French and Italian he wrote with a facility almost equal to that which he displayed in English. A large part of his work appeared anonymously. Of his books, many with impressive titles, but the most of them now little read, may be cited: 'Sixty Years of the Life of Jeremy Levis' (1831); 'Handbook of Oil-Painting' (1856); 'Bianca Capello, a Tragedy' (1868); 'The Montanini—The School for Critics—Comedies' (1868); 'Ugo da Este—Uberto—The Cid of Seville: Tragedies' (1869); 'Meleagros—the New Calvary: Tragedies' (1871); 'Marianne' (1873).

**Osborn, Sherard**, English author and navigator: b. Madras, India, 25 April 1822; d. London, England, 6 May 1875. He entered the navy in 1837 and was ordered to the East Indies where at 17 he commanded a ship in the blockade of Quedah. In 1849 and in 1852-5 he was in command of one of the ships in the expedition sent in search of Sir John Franklin. He served in the Crimean war; in China, and Japan in 1857-9; and in 1862 commanded a fleet for the suppression of piracy. He superintended the laying of the submarine telegraph between Australia and Great Britain and in 1873 was made rear-admiral. He wrote: 'Stray Leaves from an Arctic Journal' (1852); 'The Career, Last Voyage, and Fate of Sir John Franklin' (3 vols. 1860); 'The Past and Future of British Relations in China'; etc.

**Osborn, Thomas Ogden**, American lawyer: b. Jersey, Ohio, 1832; d. Washington, D. C., 27 March 1904. He was graduated from the Ohio State University in 1854, and then studied law. At the outbreak of the Civil War he organized and became colonel of the 39th Illinois Volunteers; commanded four regiments at the capture of Fort Sumter, and rose to the rank of major-general of volunteers. He returned to his practice after the war, was treasurer of Cook County, Ill., and manager of the National Soldiers' Home; he served as member of the commission appointed to settle disputed claims between United States and Mexico, and in 1873-85 was United States minister to Argentina.

**Osborne, (Samuel) Duffield**, American novelist: b. Brooklyn, N. Y., 20 June 1858. He was graduated from Columbia in 1879 and from the Columbia Law School in 1881 and practised law in New York 1881-92. He has published:

'The Spell of Ashtaroth' (1888); 'The Robe of Nessus' (1890); 'The Secret of the Crater' (1900); 'The Lion's Brood' (1902).

**Osborne House**, a large English villa, formerly the residence of Queen Victoria, situated near East Cowes (q.v.) in the Isle of Wight. The estate was willed to the Prince of Wales, who on the day of his coronation as Edward VII. announced his intention of presenting it to the nation, the building to be used (with the exception of the apartments that Queen Victoria had personally occupied and that are to be kept open to the public) as a convalescent home for officers of the army and navy.

**Osbourne, Lloyd**, American author: b. San Francisco, Cal., 7 April 1868. He was educated at Edinburgh University, traveled extensively and was at one time United States consul at Samoa. He wrote in collaboration with Robert Louis Stevenson: 'The Wrong Box' (1889); 'The Ebb Tide' (1894); etc. Among his own works are: 'The Renegade'; 'The Queen vs. Billy' (1900); etc.

**Os'cans**. See **OSCI**.

**Os'car I.** (JOSEPH FRANÇOIS BERNADOTTE), king of Sweden and Norway: b. Paris 4 July 1799; d. 8 July 1859. He was educated at the Lycée Louis le Grand and after his father had been chosen Prince-Royal of Sweden (see **BERNADOTTE**) he joined him in that country, and was proclaimed Duke of Sudermania. During the reign of his father he was three times, in 1824, 1828, and 1833, viceroy of Norway, where he made himself popular by his good administration. He afterward continued to study in retirement until the death of his father (4 March 1844) the social and political questions of the day. On his accession to the throne he immediately commenced a series of political reforms which did not, however, fulfil expectations. He resigned the government in 1857 to his eldest son (afterward Karl XV.). He wrote several works on political subjects, one of which, 'On Penal Laws and Establishments for Repression,' has been translated into French and German. He also composed an opera, and various other pieces of music. **Oscar II.** (q.v.), the present king, is his third son.

**Oscar II.**, king of Sweden and Norway: b. Stockholm 21 Jan. 1829; d. there 8 Dec. 1907. He was a great-grandson of Napoleon I.'s famous general, Marshal Bernadotte, the first king of the new independent kingdom of Norway. He was trained in the navy and at the University of Upsala, and ascended the throne in 1872, in succession to his brother, Charles XV., and was crowned 11 May 1873 at Stockholm and 18 July at Drontheim. He was recognized as a talented sovereign, speaking at least 10 languages, being well versed in naval and military history and general literature, and winning laurels as critic and poet. Among his writings are 'Some Contributions to the Military History of Sweden 1711-13' (1859-65); 'Memories of the Swedish Fleet' (1858), and translations from the German of Goethe's 'Tasso' and Herder's 'Cid.' He was elected an honorary member of the Berlin Academy, and of the Imperial Society of Naturalists of Moscow. His collected works appeared in 1875-90. They were rendered into German by Jonas (verse 1877, 1888; prose 1891).

**Osceola**, ōs-ē-ō'la, or **As-se-he-ho-lar**, that is, 'Black Drink,' Seminole chief: b. near the Chattahoochee River, Ga., 1804; d. Fort Moultrie, S. C., 30 Jan. 1838. He was a half-breed, his father being William Powell, an English trader, and his mother the daughter of an Indian chief; with her he was taken to Florida when he was four years old. His mixed blood made him no fonder of the whites than were the other members of his tribe, with whom he soon became an influential leader because of his personal bravery and his hatred and contempt of his father's people. He showed his boldness in opposing the cession of the Seminole lands in Florida. But his passive opposition was roused in 1835 to open hostility; his wife, the daughter of a fugitive slave, was seized and carried into slavery; in his anger Osceola threatened the Indian agent, General Thompson, so rudely that he was seized, imprisoned, and kept in irons for six days. Osceola precipitated the second Seminole war by massacring Thompson and four others a few months later, 28 Dec. 1835. His men who had killed Major Dade and his 110 soldiers on the same day were unsuccessful 31 December in a fight with Clinch, but they took refuge in the Everglades, emerging now and again, as in the assaults on Micanopy and Fort Drane, never winning a battle, but always led with great skill and daring, and keeping the country in terror. Two years after, 21 Oct. 1837, he was seized by General Thomas Jesup, with whom he was conferring under a flag of truce, and who excused his treachery by Osceola's alleged disregard of treaties. With several followers he was imprisoned at Saint Augustine, and then at Fort Moultrie, where he died in a few months.

**Osceola's Rebellion**. See **SEMINOLE WAR**.

**Os'ci**, or **Oscans** (Greek, *Opikoi*), an Italian people who appear to have been the original occupants, at the earliest known period, of Central Italy from Campania and the borders of Latium to the Adriatic. The Oscans were subdued by the Sabines, a people from the Apennines on the north, of whose previous history little is known, and who probably adopted the language and customs of the conquered, with what modifications cannot be ascertained. The Oscan language was closely allied to the Latin, of which it was probably a parent stock. It appears to have been spoken in the provinces long after Latin became the official language, and it was used officially long after the Roman conquest.

**Oscines**, ōs'ī-nēz, a group of passerine birds possessing highly developed vocal organs, and including most of the 'singing-birds' of the world. See **ORNITHOLOGY**.

**Oscott** (ōs'kót) College, a Roman Catholic institution founded in 1752 as a college and seminary for priests. It played a considerable part in the education of English Catholics when they were yet excluded from the English universities. The school is also called Saint Mary's Seminary. The courses in secular subjects qualify for the degree of B.A. in the London University.

**Ösel**, ē'zēl, or **Oesel**, Russia, an island of the government of Livonia, in the mouth of the Gulf of Riga, and after Seeland the largest island in the Baltic; area, 1,998 square miles.

The principal town Arensburg (pop. about 4,700) is on the southeast coast. The coast is generally bold, and the interior undulating. The soil, gravelly and not naturally rich, becomes productive by careful culture, and raises corn for export, hemp, and flax. The pastures are good, the forests large, and the fisheries valuable.

**Osgood, ōz'gūd, Samuel**, American soldier and legislator: b. Andover, Mass., 14 Feb. 1748; d. New York 12 Aug. 1813. He was graduated from Harvard in 1770, engaged in a mercantile career, but public affairs absorbed much of his attention and in 1775 he was a captain of minutemen at Lexington. For a time he acted as aide to General Artemus Ward, but in 1780 entered the Continental Congress where he served until 1784. In 1785-9 he was commissioner of the United States treasury, the first to occupy that office; and in 1789-91, postmaster-general. Later he was speaker of the New York assembly and in 1801-3 supervisor in New York. From 1803-13 he was naval officer at the port of New York.

**Osgood, Samuel**, American clergyman and author: b. Charlestown, Mass., 30 Aug. 1812; d. New York 14 April 1880. Graduated from Harvard in 1832, and from the Cambridge divinity school in 1835, he was later editor at Louisville (Ky.) of the 'Western Messenger,' was pastor of a Unitarian Church at Nashua, N. H., in 1837-41, and of the Westminster Church, Providence (R. I.) in 1841-9. From 1849 until his resignation in 1869 he was pastor of the Unitarian Church of the Messiah, New York. In 1870 he took orders in the Protestant Episcopal Church. Among his publications were: 'Studies in Christian Biography' (1851); 'God with Man' (1853); 'American Leaves' (1867).

**O'Shaughnessy, ō-shā'ně-sī, Arthur William Edgar**, English poet: b. London 14 March 1844; d. 30 Jan. 1881. In 1861 he became a junior assistant in the library of the British Museum, and in 1863 assistant in the zoological department. He won recognition as an authority in herpetology. But he was better known as a poet, his volumes being: 'An Epic of Women' (1870); 'Lays of France' (1872), a free paraphrase of the *lais* of Marie de France; 'Music and Moonlight' (1874); and 'Songs of a Worker'.

**Oshawa, Canada**, town and port of entry of Ontario County, Ontario, near Lake Ontario, and on the Grand Trunk Railway, 33½ miles northeast of Toronto. Its harbor on Lake Ontario is called Sydenham. Its industries include manufactories of engines and machinery, agricultural implements, foundry products, furniture, flour, leather, carriages, musical instruments, etc.

**Oshiba, ō-shē'bā, or Ossieba**. See FANS.

**Oshima, ō-shē-mā', Japan**, a name signifying "great island," applied to numerous island dependencies of the empire. The chief are (1) Oshima or Vries Island southwest of the entrance to the bay on which stand Tokyo and Yokohama; (2) Oshima off the southwest extremity of Hokkaido, opposite Fukuyama; (3) Amami-Oshima one of the largest islands of the Liu-Kiu Archipelago (q.v.).

**Osh'kosh, Wis.**, city, county-seat of Winnebago County; on Lake Winnebago at the mouth of the Upper Fox River, and on the Chicago & N. W., the Chicago, Milwaukee & S. F., and the

Wisconsin Central R.R.'s; about 75 miles northwest of Milwaukee and 85 miles northeast of Madison, the State capital. It was settled in 1836, and in 1853 was chartered. The city was greatly damaged by fires in the years 1859, 1866, 1874, and 1875. It is in a region where there has been extensive lumbering interests, and although the forests have disappeared in some sections, lumber is still a leading industry. The chief manufactures are lumber and lumber products, as furniture, matches, sash, doors, and blinds, wagons and carriages. It manufactures also machine products, grass twine, malting, beer, flour, canned goods, and agricultural implements. It has a large trade, as the city is the commercial centre of a considerable portion of Winnebago and the adjoining counties. Lake Winnebago is noted for its fish, and sportsmen find in the vicinity good hunting grounds. Yachting in summer and ice-boating in winter are favorite sports on this lake. The prominent buildings are the government building, city-hall, court-house, and the churches and schools. It has Saint Mary's Hospital, and about three miles distant are the State Northern Hospital for the Insane, the County Hospital for the Incurable Insane, and the County Almshouse. Oshkosh is the seat of a State Normal School, and has public and parish schools, and a public library. The government is vested in a mayor, who holds office two years, and a council. The administrative officials are appointed by the mayor subject to the approval of the council, or elected by the council, except the school board, the members of which are chosen by popular vote. Pop. (1910) 33,062.

**Osiander, ō-zē-ān'dēr, Andreas** (classicized form of HOSEMANN), Lutheran theologian: b. Gunzenhausen, near Nuremberg, 19 Dec. 1498; d. Königsberg 17 Oct. 1552. As first evangelical preacher at Nuremberg, he exerted himself in furthering the Reformation and Lutheranism, taking part against Zwinglius on the subject of the Lord's Supper. He was also present in the conference at Marburg in 1529 and at the Diet of Augsburg (1530). His refusal to consent to the Augsburg interim in 1548 cost him his position at Nuremberg. By Duke Albert of Prussia, on whom one of his sermons had produced a strong impression, he was appointed preacher and first professor of theology in the newly erected University of Königsberg, and vice-president of the bishopric of Samland. Meanwhile, in 1549, he became involved in a theological dispute, which was embittered by his obstinacy. In a discussion, 'De Lege et Evangelio,' he maintained that justification is not a judicial or forensic act in God, but contained something of a subjective nature, as the imparting of an interior righteousness, brought about in a mystical manner by the union of Christ with men. These views he continued to maintain till his death. Consult Moller, 'Andreas Osianders Leben und ausgewählte Schriften' (1870).

**Osier**, the popular name of those species of willow (q.v.) which are used chiefly for basket-making and other wickerwork. They are of low bushy growth, and they are the more valuable in proportion to the length, slenderness, suppleness, and toughness of their branches. The common osier (*Salix viminalis*), a common native of wet alluvial grounds in many



## OSIRIS—OSMIUM

parts of Europe is cultivated to supply material for basket-makers, and also is often planted to prevent the banks of rivers from being washed away. See **WILLOW**.

**Osiris**, ō-sī'ris, in Egyptian mythology, meaning "full of eyes," a son of Isis, or as is claimed by some authorities, the brother and husband of Isis, and the father of Horus. He is styled the Manifestor of Good, Lord of Lords, King of the Gods, etc. In the Egyptian theogony he represented the sum of beneficent agencies, as Set of evil agencies. Osiris, after having conquered all Egypt, and established good laws and institutions, fell a prey to the intrigues of his brother Set, the Typhon of the Greeks. He is represented under many different forms, and compared sometimes to the sun and sometimes to the Nile. In particular his soul was supposed to animate a sacred bull called Apis, and thus to be continually present among men. Sometimes he is represented as a man crowned with a mitre, a globe, a lotus-flower, or an elephant's trunk; sometimes with the body of a man and the head of an ox, ibis, or other animal; sometimes he holds a stick, sometimes a phallus, in his hand. He holds in some representations, a whip in one hand and a scourge in the other. He has frequently the horns of a bull. The worship of Osiris was introduced into Rome but the rites proceeded to such an excess of licentiousness that it was at length prohibited by law.

**Oskaloosa**, ōs-ka-loo'sa, Iowa, city, county-seat of Mahaska County; on the Chicago, Burlington & Q., the Iowa Central, and the Chicago, Rock Island & P. R.R.'s; about 65 miles southeast of Des Moines. It was settled in 1843 and incorporated in 1853. It is the commercial centre of a fertile agricultural and stock-raising region. In the vicinity are large deposits of coal, lime-stone and fire-clay. The chief industries are flour milling, manufacturing vitrified brick, wagons, iron and brass goods, heaters and woolen goods. It has a large meat-packing plant, and coal and brick yards. The principal buildings are the postoffice, the church, school and library buildings. The educational institutions are the Penn College, opened in 1873 under the auspices of the Friends, the Oskaloosa College, under the auspices of the Disciples of Christ, a business school, and a public library. The Society of Friends of the State of Iowa hold their annual meeting here. Pop. (1910) 9,466.

**Osler**, William, Canadian physician, educator, and author; b. at Bondhead, Tecumseh, Ont., 12 July 1849. He studied at Trinity College, Toronto, at the Toronto school of Medicine, and at McGill University, where he graduated M.D. in 1872. Proceeding to Europe he continued his studies at University College, London, in Berlin and in Vienna, and returning to Canada in 1874, received the appointment of professor of physiology and pathology in McGill University, which he retained until appointed to the chair of clinical medicine in the University of Pennsylvania in 1884. He was chosen as the Galstonian lecturer in the Royal College of Physicians, London, Eng., in 1885; and as the Cartwright lecturer in the College of Physicians and Surgeons, New York, in 1886. The degree of LL.D. was conferred upon him by the

universities of McGill, Edinburgh, Aberdeen, and Yale; he was elected a fellow of the Royal Society of England; and a member of the London Royal College of Physicians. In 1889 he was appointed professor of the principles and practice of medicine in Johns Hopkins University and chief physician to the Johns Hopkins Hospital, Baltimore, positions which he resigned in 1904 upon his appointment as regius professor of medicine in the University of Oxford, Eng. A writer of international repute in various American and European medical journals, he is also the author of 'Clinical Notes on Smallpox' (1876); 'Histology Notes' (1882); 'Cerebral Palsies of Children' (1889); 'Principles and Practice of Medicine' (1892), a standard modern work which had reached a fifth edition in 1903; 'Chorea and Choreiform Affections' (1894); 'Lectures on Abdominal Tumors' (1895); 'Angina Pectoris and Allied States' (1897); 'Cancer of the Stomach' (1900).

**Osman Digna**, ōs-mān' dīg'na ('Osman the Bearded'), Sudanese chief; b. 1836. The story that he was of French birth is probably without foundation. He was a slave-trader; suffered financial losses because of English interference with his ships; raised an army of 20,000 men in 1881-2 to assist Aribi Pasha against the English; as chief of the sheiks of Eastern Sudan contributed largely to Gordon's capture and death by blocking the approach to Khartum, through Suakim; was the hero of a long and costly siege at Tokar in 1887-8; joined the Mahdi in the rising of 1899; and in 1900 was captured and imprisoned at Rosetta.

**Osman Nuri Pasha**, noo'rē pāsh'ā, called GHAZI, "the Victorious," Turkish general; b. Amasia, Asia Minor, 1837; d. Constantinople 5 April 1900. He saw service against the Druses in 1860 and in Crete in 1867, fought in the Yemen campaign of 1871, became marshal in 1876, and in the war with Russia, after bold and brilliant maneuvers, occupied Plevna, which he was forced to surrender 10 Dec. 1877, in spite of his heroic attempt to break through the forces of his besiegers. He was returned to Turkey after the treaty of San Stefano, entrusted with the reorganization of the Turkish army, and was minister of war 1880-5, and marshal of the palace after 1880. Consult Levaux, 'Ghazi Osman Pacha, Souvenirs historiques' (1891).

**Osmanie**, ōs-mā'ne-ā, Imperial Order of. See **ORDERS**, **ROYAL**.

**Os'melite**, the same as **PECTOLITE** (q.v.).

**Osmium**, a metallic element of the platina group, commonly found with iridium (q.v.). It was discovered by Tennant in 1804. Osmium-iridium is found in Neoyanskite and Syfferskite as very hard black grains; as a cubic or obtuse rhombohedral crystal it is bluish white, with violet lustre, and greater hardness than glass. The element has the atomic weight 191, and the high specific gravity of 22.5. Osmium can be fused only by the heat of an electric arc. It forms three chlorids, OsCl<sub>3</sub>, OsCl<sub>4</sub>, and OsCl<sub>5</sub>; the oxids, OsO, Os<sub>2</sub>O<sub>3</sub>, OsO<sub>2</sub>, OsO<sub>3</sub>, and OsO<sub>4</sub>, commonly called osmic acid, which has pungent and poisonous vapors, is extremely volatile, and is a powerful oxidizer. In alloy with iridium, osmium is used for pointing gold pens.

**Osmo'sis**, the diffusion of fluids through membranes. If a septum composed of either organic (such as a bladder) or inorganic (such as porous earthenware) be interposed between two liquids holding different substances in solution, the liquids will pass through the septum carrying some of the matter in suspense with them; that is, they will diffuse one into another. This phenomenon is called osmosis. The liquids pass through the interposed medium at different rates, gradually getting slower, until they are said to be balanced. If a bladder filled with a solution of sugar be immersed in water, seven parts of water (by weight) will enter the bladder while one part of sugar escapes into the water. The action of the liquid parting with its soluble matter is called endosmosis, the flow of the liquid receiving it exosmosis. Both must act simultaneously, one cannot exist independently of the other; together they constitute the phenomenon of osmosis. Sugar has the strongest power of endosmosis among the vegetable substances and albumen among the animal. Endosmosis usually takes place in the direction of the denser liquid, although there are some exceptions, such as ether, alcohol, etc., which act like liquids heavier than water. This diffusion has variously been explained by capillary attraction, unequal absorption, and chemical action. The latter theory would seem to be the most plausible as the septum is generally found to have been acted upon and in a state of corrosion. The laws of osmosis apply also to gases. Diffusion of dissolved substances takes place only to the limit of saturation of a liquid, and exerts an osmotic pressure comparable to gas pressure and subject to the same laws. In order to have osmosis take place the liquids on either side of the interposing septum must be of unequal osmotic pressure. (See CHEMISTRY.)

Osmosis plays an important part in plant physiology. The plant cell consists of a mass of protoplasm enclosed within a flexible organic membrane (the cell wall) which encloses a fluid. This membrane is permeable to water and generally to all substances it may hold in solution; but the protoplasm itself is only permeable to water containing such substances as it requires for its nutrition—it would seem to be endowed with the power of selection. Thus cells in different plants, or cells in different parts of the same plant, possess very different powers of osmosis. Water is the only solvent in plant life. When a cell becomes full or swollen it is said to be turgid, but this turgidity is constantly relieved by osmosis taking place from cell to cell and by final evaporation. As soon as the osmotic pressure in one cell falls below that of a cell or cells with which it is in juxtaposition, osmosis takes place, and thus a fair degree of equilibrium is maintained. Osmotic pressure is enhanced by electrolytic dissociation (see DISSOCIATION) which takes place in plant life on account of the presence of acids and salts (electrolytes) of various kinds which are found in solution both in and surrounding all plant life. The phenomena of osmosis still present a fertile field of research for the scientific mind. See ABSORPTION; SOLUTIONS.

ARTHUR S. WITHERSPOON,  
Editorial Staff, 'Encyclopedia Americana.'

**Os'mun**, Thomas Embley ('ALFRED AYRES'), American orthoepist: b. Montrose,

Ohio, 26 Feb. 1834; d. New York 26 Oct. 1902. He was graduated from Oberlin College and later studied medicine in Paris and Berlin. In 1859 he returned to the United States and settled in New York. Resolving to make a life-work of the purification of the English language as used in the public press, he became an authority on the use of English, and also attained distinction as a dramatic critic. Subsequently he taught elocution and in 1891 he appeared as Shylock in Boston and other New England cities. He published: 'The English Grammar of William Cobbett' (1884); 'The Orthoepist' (1884); 'Some Ill-Used Words' (1901); etc.

**Osmun'da**, a genus of tall swamp ferns with free capsules (sporangies) opening by a longitudinal slit. The root-stocks are large and erect or creeping. The sporanges are large, globose, naked, and situated on the margins of their rachis-like divisions. The spores are copious and green. One species, the royal fern (*O. regalis*), is cultivated in various parts of the world on account of its elegant appearance. It grows in clumps of 2 to 5 feet in height, and is well adapted for open moist places, where the soil is rich and shade thin, or even where full sunlight falls. Consult Bailey, 'Cyclopedia of Horticulture' (1901).

**Osnabrück**, ös'nä-brük, Germany, a town of Hanover, Prussia, on the Haase, 70 miles west of Hanover. In the old town the streets are generally narrow and the houses low; but the new quarters have wide and handsome streets, and fine residences. The chief buildings are the ancient Protestant churches of Saint Catherine and Saint Mary; the Roman Catholic cathedral; the Protestant and Roman Catholic gymnasiums, the town-house, with statues (1889-90) of German emperors on the façade; the Friedenssaal (Hall of Peace), restored in 1890; the museum (1889), the new hospital, and the commercial school. Osnabrück has iron and steel works, railway workshops, machine-shops, iron-foundries, wire-works, paper-mills, flax and cotton-mills, bleach-fields, tile-works, breweries, etc. Osnabrück gave its name to the coarse linen known among English-speaking people as osnaburghs. It was created a see in 888, and in 1082 was surrounded by walls. It afterward entered the Hanseatic League, but never became a free imperial city. The negotiations for the Peace of Westphalia, which ended the Thirty Years' war, were carried on here. Pop. about 55,000.

**Osorio**, Manoel Luiz, mā'noo-ël loo-ët'h' ð-sô'rê-ô, Brazilian soldier: b. near Pelotas, Brazil, 10 May 1808; d. Rio de Janeiro, Brazil, 4 Oct. 1879. He entered the army at an early age and in the civil war in Rio Grande do Sul, 1839-45, he attained distinction. In the campaign in Uruguay in 1851-2 he was again prominent and at the outbreak of the Paraguayan war in 1865 was made commander-in-chief, but was superseded by Caxias in 1866. He was made lieutenant-general in 1867 and continued to serve until 1869 when he was seriously wounded. He entered politics after the war, became senator in 1877 and from 1878 until his death was minister of war. He was created Marquis of Herval by the government, but his chief title of honor was 'O Legendario' (the Fabulous) bestowed upon him by his soldiers for his bravery.

**Os'prey.** See FISH-HAWK.

**Ossa**, ōs'a, Greece, the classic name of Kissavos, a mountain 6,408 feet high, in the northeast of Larissa, overlooking the Gulf of Saloniki. The Vale of Tempe separates it from Olympus, 9,794 feet high, and to the southeastward is Mount Plessidi—ancient Pelion—5,308 feet high. These three mountains are renowned in Greek mythology, and the classic phrase "piling Ossa upon Pelion" refers to the giants Ephialtes and Otus arranging to place Ossa upon Pelion to aid them in reaching the summit of Olympus. This conception is said to have been suggested by the conical form of Ossa and the flat summit of Pelion. The seats of the Centaurs and Giants are located in the neighborhood of Ossa and Pelion.

**Ossein**, ōs'e-in, the organic basis of bone allied to gelatine. If a bone is placed in acid, 20 per cent hydrochloric, the inorganic matter (salts, etc.) is dissolved out and by repeated washings only the organic matter remains. This retains the shape of the bone without its hardness. It will not dissolve in cold water, but if boiled it reduces to gelatine. See BONE.

**Ossian**, ōsh'i-an, or more correctly, **Oisín**, appears in Gaelic literature and legend as the son of Finn, or Find, the hero of what has been styled the Fennian or Oisíanic cycle of tales and poems current in Ireland and the highlands of Scotland. Finn is the hero of all these tales and poems, as Arthur is of the Arthurian cycle; Oisín is his poet and bard, as well as his son. This Oisíanic cycle exists side by side with a heroic cycle which consists of about 30 tales, forming one of the most complete epic cycles to be found in any literature. They are tales of battle, narratives of adventure, all circulating round the person of the hero Cuchulaind. They are mixed prose and verse and many of them are extant in manuscripts written about the 12th century. The Oisíanic cycle is of a different period. Finn, the heroic figure, is a less legendary and mythological personage than Cuchulaind; he lives in the 3d century at the time when the Romans occupied Great Britain and moves through the story almost like a historical character; the supernatural is almost entirely lacking in his adventures, and he fights his battles as a leader of mercenaries engaged, after the country has been conquered, in keeping the native races of Scotland in check. These stories are found in good manuscripts of the 15th century and their style points to the fact that a stage of culture has been reached by the rude inhabitants of North Britain very different from that described in the heroic cycle, where Medb, queen of Connaught, contends with Mac Nessa, king of Ulster, for the possession of the brown bull of Cualnge, and Cuchulaind defends Ulster single-handed and discomfits with his unaided sword the valor of whole armies. In the heroic cycle the characters are completely mythological, but they are distinctly described as to their dress or arms. In the Oisíanic cycle the figures of the actors become more vague; there is an exaggeration in the reported exploits of the warriors, although the excitement of the hunt, and the riot of the royal drinking bout, as therein depicted, are evidently clear transcripts from the primitive life of their period. There is one important point to be noted with regard to

these two types of ancient Celtic literature in Scotland. They are as distinct in style, color, and development as in their *dramatis personæ*. They belong to different eras, and their heroes never meet on the same stage; the hero of the earlier cycle has vanished when Finn, the Oisíanic warrior, comes upon the battlefield.

This is a very important part in deciding one of the most angry literary controversies of the 18th century. The Celtic legends as they were preserved orally or in manuscript attracted the fancy of James MacPherson (q.v.), a Scottish schoolmaster, who published what he averred to be translations from "the Gaelic or Erse" in the shape of "Fragments of Ancient Poetry" (1760) and subsequently produced 'Fingal' (1762) and 'Temora' (1763), afterward collected into a single volume under the title 'The Poems of Ossian.' There was much merit in these works as poems. The descriptions of scenery were often beautiful, and approaching the sublime, and the wildness of highland mountain and lake was vividly portrayed. But apart from the want of detail in the account given of the dress, buildings and social life of the personages introduced there was one circumstance that proved these poems to be anything but translations of a connected "Gaelic or Erse" composition. The heroes of the heroic cycle were made to mingle with the heroes of the Oisíanic cycle in the narrative. And this was not all. MacPherson never produced during his lifetime the original poems which he averred were in his possession. After his death, however, some manuscripts were found in which fragments from both periods of genuine ancient poetry were found patched together in a cento with some very indifferent Gaelic of his own, and so arranged as to form a sort of counterpart to his 'Poems of Ossian.' The more recent studies in Gaelic literature have furnished us with this solution of the Ossian controversy; and have made it apparent that, while MacPherson might have been at liberty to fuse certain ancient poems, as Fitzgerald has done in his Omar, to produce a beautiful romance of his own, he committed a grave and unpardonable error in attempting to forge originals to support his claim that his work was a translation pure and simple. Consult: Simpson, 'Poems of Ossian' (1857); McLauchlin, 'The Book of the Dean of Lismore' (1862); Nutt, 'Ossian and the Ossianic Literature'; Windische, 'Die Altirische Sage und die Ossianischen Gedichte' (1878).

**Os'sifica'tion**, the process of bone formation, which in all cases essentially consists of the deposition of earthy or calcareous matter. It may exhibit two modes of occurrence. Bone may be formed by the deposition of earthy or osseous material in fibrous membranes, that is, in tissues composed of fibres and cell elements. The flat bones of the skull or cranium are developed in this first manner. No granular or intermediate stage is observable in this process, the earthy matter being simply deposited in spaces which result from absorption. In the second mode, exemplified in the formation of the long bones of the skeleton, the osseous material is deposited in a primary basis of gristly or cartilaginous kind. Ossification in this latter instance is therefore said to begin in carti-

lage, just as in the previous case it began in membrane. The process of ossification in cartilage exhibits activity at several distinct and marked points of its extent. These points are the active centres of bone-growth, and are hence called centres of ossification. The limy material is therefore diffused from these centres throughout the extent of cartilage, the blood-vessels of the adjoining parts bringing supplies of material from which the earthy matters are deposited within the cartilaginous basis. The corpuscles of the cartilage are seen to be arranged in vertical rows, and the calcareous matter, deposited in the form of granules, is thrown in around them. The nuclei of the cartilage cells are left unossified, a space also being kept free around each nucleus, which becomes one of the lacunæ or minute cavities seen in a microscopic section of bone-tissue. The first deposits of bony matter are of an irregular and thick description, this form of ossification, if persisted in, producing cancellated bony tissue; while by a subsequent process of absorption of the spaces in the cancellated tissue, and by the further deposition of bony matter, the irregular tissue is converted into compact bone. The gradual growth of bone takes place by a continual development of the cartilaginous basis between the various centres of ossification, and in this new basis earthy matter is as continually being formed.

Ossification may also occur abnormally in living textures, and as the result of diseased conditions. Deposits of limy matter thus take place within the coats of blood-vessels, rendering them friable and readily ruptured. The valves of the heart may become calcareous, and calcareous degeneration may even affect tumors and other products in themselves of abnormal nature. A distinction ought to be made between mere calcification as just indicated, and true ossification, or the formation of bone. But in either case the deposition of limy matter forms the basis or essential feature. The gall-bladder may thus be converted into a hard limy sac or bag, and even the pericardium or investing sac of the heart may occasionally exhibit a high degree of calcification. See BONE.

**Ossining**, ōs'īn-īng, formerly **Sing Sing**, N. Y., village in Westchester County; on the Hudson River, and on the New York Central & Hudson River railroad; about 30 miles north of New York. It was settled about 1698, incorporated as a township 2 May 1845, and as a village some years later. The name Sing Sing, by which it was known until 1901, comes from an Indian word meaning a stony place. One of the State prisons is located here, just outside the village limits, and is known as Sing Sing prison; hence the villagers desired a change of name, and chose Ossining. The village, located upon rocky hills, overlooks Tappan Bay and a long and beautiful part of the river. In the early part of the 18th century silver, copper and some gold was found here, and considerable capital was expended in developing mines which never proved productive. The chief manufactures are shoes, leather, machinery, foundry products, pills, porous plasters, drills, and plated goods. The trade is chiefly in its own manufactures and farm products. Some of the places of interest are the Croton Aqueduct Arch, 88 feet span and 70 feet above water, and the arched high-

way bridge. The State prison, a large white building, made of dolomite, a coarse marble quarried nearby, was founded in 1826. Capt. Elam Lynds brought here 100 convicts from the State prison at Auburn and put them to work to wall themselves in. Men only are confined here. The village has long been noted for its educational institutions; it has Holbrook, Saint John's, and Mount Pleasant Military academies, Ossining Seminary for young women, public and parish schools, and a public library. There are six churches. The two banks have a combined capital of \$200,000. The government is vested in a president and nine trustees. The president and three trustees are elected each year. The village owns the waterworks. Pop. (1910) 11,480. Consult: Ingersoll, 'Hudson River and Catskill Mountains'; Scharf, 'History of Westchester County.'

M. MORAN,  
Editor 'Democratic Register.'

**Ossoli**, ōs'ō-lē, **Sarah Margaret Fuller**, MARCHIONESS, American writer: b. Cambridgeport, Mass., 23 May 1810; d. off Fire Island beach 16 July 1850. She was remarkable for her precocity and her association with Emerson and other eminent literary men, rather than for her own productions. She was taught at six to read Latin, and early made herself acquainted with English and continental literature. She taught in public and private schools in Boston and Providence, and frequently visited Brook Farm (q.v.), though she never resided there, and had no confidence in the final success of that enthusiastic experiment. In 1840-2 she was editor of the 'Dial,' which numbered Emerson and other distinguished writers among its contributors. In 1844 she removed to New York, and became literary critic of the *Tribune*. In that capacity she worked effectively toward the increase of public interest and the improvement of public taste in literary, artistic, and other matters. She visited Europe in 1846, met there leaders in literature, art, and philanthropy, married in 1847 the Marquis d'Ossoli; was in Rome during the siege of 1849, when she served in the hospitals; embarked with her husband for New York, but perished almost in sight of port during a severe storm. The position she took in the American literary world of the time would perhaps be not wholly intelligible to one now reading much of what she wrote. Her critical articles are her best by far, many being brilliant and exhibiting what Higginson calls "the power of putting a high thought into a sentence." She sought to abolish the colonial spirit in American thought and letters, and contemporaries bear witness to the reality and excellence of the service. Consult the 'Memoirs' by Emerson, Clark, and Channing (W. H.) (1852); and the biographies by Howe (1883); and Higginson (1884) 'American Men of Letters' series.

**Ossuna**, ō-soo'nā, **Duke of**. See OSUNA, PEDRO TELLEZ Y GIRON, DUKE OF.

**Ostade**, ōs'tā-dē, **Adrian van**, Flemish painter: b. Haarlem December 1610; d. there 2 May 1665. He studied under Frans Hals. His pictures exhibit an exact imitation of nature, and contain realistic representations of subjects which in other hands would have been mean or commonplace, such as the interiors of ale houses or kitchens, with Dutch peasants smoking,

quarreling, or drinking, and he puts such expressions into the heads of his characters that their coarseness is lost in our admiration of their truth and animation. His coloring is rich and clear, his touch spirited and free, and all his works are highly finished. He was also a good etcher. Among his pictures (which are generally small) may be mentioned 'The Smoker'; 'The Drinker'; 'The Dancer.' He also painted many portraits.

**Ostade, Isack van**, brother and pupil of the preceding, Flemish painter: b. Haarlem 2 June 1621; d. there 16 Oct. 1649. He at first applied himself to paint the same subjects as those which had brought such a brilliant reputation to his brother, but soon abandoned taverns and kitchens for scenes in the open air, both summer and winter landscapes, and with such success that at the time of his death at 36 he was rapidly rising to be a rival to his brother. Original in style, his pictures are remarkable for good composition, masterly drawing and solid painting. Most of them are in England, where they were valued before his fellow countrymen came to a knowledge of his genius. Among the most valued of them are: 'A Village Inn'; 'View of a Frozen Canal'; 'Landscape and Cottages'; 'Village Scene' (showing cavalier on gray horse, horsemen with red cloak and post wagon); 'Winter Landscape in Holland.' The 'Halte de Voyageurs' and 'Vue de Village' were sold (1865) for upward of \$5,000 each.

**Ostei'tis**, inflammation of the substance of bone. In its chronic forms it may result in supuration; in caries, a decay of the bone in particles; or in necrosis, a decay of the bone in slices. In acute cases low diet, aperients, leeches, etc., are employed; but in chronic cases, tonics, good air, and possibly removal of the diseased bone may be required.

**Ostend**, *ös-tënd'*, Belgium, a seaport town and pleasure resort, in the province of West Flanders, on the North Sea, 67 miles northwest of Brussels. Ostend is connected by rail with all parts of Belgium, France, and Germany; and steamers ply regularly to and fro from London and Dover. It was strongly fortified prior to 1865, since when the fortifications have been replaced by fine promenades. It has a healthful situation, although on a low sandy coast, and is resorted to for sea bathing, etc., by about 50,000 visitors annually. Along the sea front is a massive digue or esplanade of stone and terra-cotta, three miles long, forming a fine promenade. The public buildings include the Hotel de Ville, three churches (one finished in 1883), an English church, large Kursaal, barracks, etc. The harbor is not easy of access, but has been greatly improved since 1898; the basins within are extensive, and form the termination of a magnificent line of canals stretching like a network into the interior, and furnishing admirable facilities for commerce. The manufactures are unimportant, the chief being linen, sail cloth, and tobacco. Shipbuilding is also carried on. Cod and herring fishing are considerable industries, and an important branch of trade is oysters, fattened here in large salt reservoirs, and transported as far as Paris. Ostend was founded in the 9th century, walled in 1445, and regularly fortified in 1585 by the Prince of Orange. In

the great struggle to throw off the yoke of Spain it sustained a memorable siege from 4 July 1601 to 28 Sept. 1604, during which the besieged lost about 50,000 men, and the Spanish besiegers more than 80,000.

**Ostend Manifesto**, The, a term used in the diplomatic history of the United States since 1854. In that year, 9 October, a despatch was forwarded to the United States government by the American ministers at the courts of Great Britain, France, and Spain, who had met in the city of Ostend, by the government's request, to discuss the Cuban question. The despatch declared that, if Spain would not sell Cuba, self-preservation required the United States to take the island by force, and prevent it from being Africanized like Haiti. The suggestion was not approved in the United States by statesmen or politicians and was strongly condemned.

**Osteol'opia**, a genus of fossil long, slender crossopterygian fishes, peculiar to the Lower Old Red Sandstone of Scotland. It is characterized by smooth rhomboidal scales, by numerous sharply pointed teeth, and by having the two dorsal and anal fins alternating with each other. This, with *Diplopterus*, etc., constitutes the family *Osteolepidae*, represented in America by the genus *Megalichthys* of Carboniferous and Permian formations.

**Os'teomala'cia** (also called **MALACOSTEON** and **MOLLITIES OSSIUM**), a disease occurring most frequently in women, but sometimes in men, characterized by softening of the bones through progressive disappearance of the earthy salts. It affects the different parts of the skeleton, and deformities are often caused by it. It is mainly confined to adults, does not ordinarily attack the aged, and among women is likely to be associated with pregnancy, or to follow child-bearing, abstention from which affected women should strictly practise. It may progress for years, and then end in fatal complication with lung disease, or through exhaustion. The causes assigned are many, but their determination is as yet incomplete. Surgery has sometimes proved more efficacious than medical treatment in this disease, which demands the most thorough hygienic care in all cases.

**Osteol'ogy**, that branch of anatomy which treats of bone or of bones. The bony element of the body is for the maintenance of form and motion, support of weight and muscles, and the protection of the internal organs. It is one of the hardest structures of the body, possessing a certain degree of toughness and elasticity. (See **BONE**.)

**Development of Bone**.—In the foetal skeleton the long bones of the limbs are cartilaginous. Hence there are two kinds of ossification, intracartilaginous and intramembranous, and to those must be added the subperiosteal. In intracartilaginous ossification the cartilage-cells increase rapidly in number and arrange themselves in rows, the cells being closely packed and wedged together. The intracellular matrix of the cartilage is semi-transparent. Lying below this cartilaginous layer near the centre of ossification is a layer composed of osteoblasts. The intramembranous ossification is that by which the bones of the vertex of the skull are entirely formed.

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**Marrow.**—The marrow differs in composition at different periods of life and in different bones. In the young it is a transparent reddish fluid of tenacious consistency, free from fat, and contains minute roundish cells. In the shafts of the adult long bone the marrow is of a yellow color and contains a large quantity of fat and areolar tissue. In the flat and short bones, in the articular ends of the long bones, in the bodies of the vertebræ, in the base of the cranium, in the sternum and ribs, it is of a red color, consisting of albumen and extractive matter with a mere trace of fat.

**Nourishment of Bone.**—This is derived from the numerous blood-vessels and lymphatic glands. Those of the compact tissue are derived from a dense network of vessels ramifying in the periosteum. From this membrane vessels pass into the minute orifices of the compact tissue.

**Bones of the Human Body.**—The skeleton of the adult consists of 200 distinct bones. The spine proper or vertebral column, includes 26; the cranium, 8; the face, 14; osphryoides, sternum and ribs, 26; upper extremity, 64; lower extremity, 62.

**Long, Short, Flat, and Irregular Bones.**—The long bones, found in the limbs, are built to sustain the weight of the trunk and confer the power of locomotion. A long bone consists of a lengthened cylinder, a shaft with two extremities. The shaft is a hollow cylinder, the walls consisting of a dense compact tissue of great thickness. They are the humerus of the arm, radius and ulna of the forearm, carpus, metacarpus, and phalanges of the hand; the femur of the thigh; tibia and fibula of the leg; tarsus, metatarsus, and phalanges of the foot. Where a part of the skeleton is intended for strength and compactness and its motion is at the same time slight and limited, it is divided into a number of small pieces united together by ligaments. The separate bones are short and compressed, as, for example, the bones of the carpus and tarsus. These bones in their structure are spongy throughout except at their surface, where there is a thin crust of compact tissue. Where the principal requirement is either extensive protection or the provision of broad surfaces for muscular attachment, the osseous structure is expanded into broad, flat plates, as seen in the bones of the head, pelvis, foot, and hand. The irregular or mixed bones are such as from their peculiar form cannot be grouped under the preceding heads. They are the vertebræ, sacrum, coccyx, temporal, and sphenoid.

The spine is a flexuous and flexible column formed of a series of bones called vertebræ. They are 33 in number exclusive of those which go to form the skull, and have received the names cervical, dorsal, lumbar, sacral, and coccygeal, according to the position they occupy; seven cervical, twelve dorsal, five lumbar, five sacral, and four coccygeal. The sacral and coccygeal vertebræ consist at an early period of life of nine separate pieces, which are united in the adult, so as to form two distinct bones, the sacrum and the coccyx. Each vertebra consists of two essential parts, an interior solid segment or body, and a posterior segment or arch. The bodies of the vertebræ are piled one upon the other, forming a strong pillar, for the support of the cranium and trunk, the arches form-

ing a hollow cylinder behind for the protection of the spinal cord. The different vertebræ are connected together by means of the articular processes and the intervertebral cartilages, while the transverse and spinous processes form levers for the attachment of muscles. Between each pair of vertebræ apertures exist through which the spinal nerves pass from the cord. The peculiar vertebræ of the cervical are the atlas and axis modified from the other vertebræ to admit of the nodding and rotary movement of the head. The atlas supports the globe of the head, the axis forming a pivot upon which the head is rotated. To the atlas and axis are attached the muscles of the neck and spine.

The large triangular bone situated at the base of the vertebral column at the upper and back part of the pelvic cavity is called the sacrum (q.v.).

The coccyx, the extreme end of the spinal column, in shape resembles a cuckoo's beak. It is formed of four small rudimentary vertebræ. It articulates with the sacrum and is attached to the levator and sphincter-ani muscles, the gluteus maximus, and the coccygeus muscles.

The superior expansion of the vertebral column is called the skull, and includes the cranium and the face. (See SKULL.)

The hyoid bone is named from its resemblance to the Greek, *upsilon*. It is called the lingual bone because it supports the tongue. To it are attached the muscles of the throat.

The sternum is a flat narrow bone situated on the median line of the front of the chest, and to it are attached some of the muscles of the chest and abdomen, articulating with the clavicles and seven costal cartilages.

The ribs are elastic arches of bone which, with the intercostal muscle, form the thorax. They are 12 in number on each side. The first seven are connected behind with the spine, and in front with the sternum through the intervention of the costal cartilages. The remaining five are called false ribs. To the ribs are attached the muscles of the chest, abdomen, throat, back, and diaphragm.

The anterior portion is called the clavicle, or collar-bone. (See CLAVICLE.)

The scapula forms the back part of the shoulder. It is a large flat bone triangular in shape, situated at the posterior aspect and side of the thorax between the first and eighth ribs. To it are attached the muscles of the shoulder, arm, and thorax.

The humerus is the longest bone of the upper extremity. It consists of a shaft and two extremities, articulating above with the scapula and below with the ulna and radius. To it are attached the muscles of the arm, forearm, and thorax.

The ulna is a long bone placed at the inner side of the forearm parallel with the radius and with it articulating with the humerus, forming the elbow-joint.

The radius is situated at the inner side of the forearm parallel with the ulna, with which it articulates, forming at its lower end the wrist-joint. The ulna and radius form the attachment for nearly all the muscles of the arm, hand, and fingers. (See ARM.)

The hand is subdivided into three segments, the carpus or wrist, the metacarpus or



## OSTEOMYELITIS — OSTEOPATHY

palm, and the phalanges or fingers. (See HAND.)

The os innominatum, or hip-bone, forms the side of the pelvic cavity. It is divided into three portions, the ilium, ischium, and pubes. It articulates with its fellow of the opposite side, the sacrum and the femur. It forms the attachment of the muscles of the thigh, abdomen, and pelvis.

The longest bone in the skeleton, to which are attached the muscles of the leg and thigh, is the femur (q.v.).

The patella (q.v.) protects the front of the knee-joint and increases the leverage of the quadriceps extensor muscle. The tibia, situated at the front and inner side of the leg, beginning at the knee, is long and narrow, with enlarged extremities, articulating with the femur, fibula, and astragalus. The fibula is situated at the outer side of the leg, is smaller than the tibia, and forms with it the attachment of the muscles of the leg and foot. The bones of the foot consist of three divisions, the tarsus, metatarsus, and phalanges. (See FOOT.)

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**Os'teomyeli'tis**, inflammation of the inner lining membrane (endosteum) and the marrow-cavity of bone, a disease of rare occurrence, mostly following amputations. It also follows wounds whereby the medullary canal is exposed to the air, such as gunshot wounds, compound fracture, etc. The inflammation is due to pyogenic infection, is generally acute, and extends from the marrow to the osseous structure itself. Chills, sweats, and high fever sometimes accompany the usual symptoms of pain and swelling, with a purulent discharge appear sloughs of tissue and dead bone. In children an acute form of osteomyelitis is sometimes seen which it is often difficult to distinguish from rheumatism. Surgery alone is practicable in the direct treatment, with such medical and hygienic accessories as the physician may prescribe.

**Osteopathy.** A method of treating diseases without drugs, which relies on the intrinsic powers and provisions of the body, when these are made free to act according to their specific constitution, by means of the mechanical engineering of the body in its affected parts, and their restoration to the normal condition, relation and action. Its essential point of departure from chemical medicine is the biological postulate that the sole and sufficient remedies for the cure of disease are within the body, and that these may be made effectual by structural adjustment without extraneous aid; other than those supplied by an ordinary environment. It holds that the initial pulse and substantive action within the living organism is always superior to and sovereign over any and all reactions induced from without. It exalts the internal, constitutive and formative powers of the body, and makes them primary and paramount. It studies the living body as the supreme mechanical masterpiece, in which alone are superintended and supplied the processes and products, in the exact quantity and quality which the body needs, by which the vital functions of digestion, absorption, assimilation, growth, repair and health are maintained. It maintains that the body not only has, but is, the final

laboratory, in which are conducted the remedial processes by which it recovers from disease, by means of its own powers and appliances. These are accounted so great that it can bring together in mouth, stomach and intestines, with the assistance of the entire circulatory, secretory and excretory systems, the materials of its subsistence; in such close contact and under such wonderful conditions of heat, solution and reaction; can infuse their elements with such affinities and make these affinities so operative; can exert such influences, that forthwith some new substance is wrought into its own being, with powers and energies the most subtle or the most tremendous. It may be death to any or everything inimical to the body, or it may exercise on the organism the most blessed virtue, restoring the wasted tissues, reanimating the vital flame and carrying into the most secret recesses of life the potent influences of health. All this is done under the control of the brain and nerves, which have all the characteristics of a mechanism constructed for a purpose. The nervous system, unexhausted and apparently unexhaustible in the complexity and subtlety of its structure and action, with its ramifications of specialized tissue, permeating every portion of the body, constituting the very essence of every special organ, some of which are the channels of all receptive and others the channels of all reactive powers, constitutes the special study of Osteopathy. This wonderful mechanism is endowed with powers to manufacture, maintain, and manage every chemical necessary to every function of the body. Here is the drug-store of nature. This, alone, is the true *vis medicatrix naturæ*. One may perceive how extraordinary these powers and properties of the body are, unaided by artifice, by supposing a locomotive engine to possess like powers to carry on a process of self-repair, in order to compensate for wear; to grow and increase in size, detaching from itself, at intervals, pieces of brass or iron endowed with the power of growing up, step by step, into other locomotives, capable of running themselves, and of reproducing new locomotives in turn. Precisely these things are done by every living body,—constantly and for years.

This is a mere suggestion of the facts upon which Osteopathy has constructed its philosophy of cure. It goes beyond the old chemosis of drug-therapy, and has established a biosis, which is the essence of growth, repair and cure, thus bringing therapeutics upon the plane of biology rather than of chemistry; and holds that all cure is intracorporeal, without the imposition of an external form upon the concrete processes of life. The very essence of life, whether in a developing or a developed organism, consists in responses to the stimulations of its environment. Receptivity, however, is superior to stimulation, and initiation to reaction. Receptivity involves interpretation of stimuli, and initiation of movement is in order to adjustment of the organism to nutrient materials, and adjustment is followed by assimilation of the presented materials. The mechanism of adjustment marks the degree of development in the organism, and in the human body it is well-nigh perfect. Failure in assimilation is due to defects in adjustment, which is the measure of disease. If disease be considered as mal-ad-

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justment to environment due to defective action and reaction in the living organism, then cure would necessitate, not the introduction of supplementary supplies made by artifice, but a detection and correction of the defects in adjustment to the real source of all-sufficient supplies. The body is not a finished product with variant and definite limitations, but a living process with established and almost infinite possibilities. There is a prevision and a provision within the living organism by which it may rise superior even to heredity, as well as environment, until it meets and masters the conditions of a progressive or an established achievement. This provision is selective adaptation, which is operative, not alone in the conscious, but in the unconscious and even subconscious regions. Adaptation involves selection, and the power of selection places the organism on the plane of mind. The ultimate act of mind is the appropriation or rejection of the presented materials of supply. Appropriation is in order to assimilation and implies elements of intelligence, feeling and volition. Rejection is in order to self-preservation, and implies the same elements. The living body is, therefore, self-conserving, in the highest sense. There is reason and purpose in all its structures and functions, and these are designed to accomplish specific results. Osteopathy reasons that all organized bodies exist as such by virtue of a final cause; that purpose rules supreme as a law governing all facts in organic nature; that in organized bodies nothing is in vain. Not to know the purpose and the law does not subvert the facts, or make necessary or legitimate any procedure contrary to the facts. Osteopathy takes both materials and methods from life itself. Osteopathy postulates life as its basal principle, out from which all organization and structure proceeds. There are certain inner actions which are predominate over all reactions and constitute the essential impulses and initial conditions of all growth, repair and cure. These inner actions pertain to the substance of life, while the adjustments of these actions constitute the form of life. Neither the forms nor the substance can be supplied *ab extra* to the body, but are inherent in and sufficient for all ordinary and extraordinary conditions.

The old postulate upon which chemical medicine is based—that life is a struggle because it proceeds from a poverty of resources, and that, consequently, only the fit may survive before the insurgent pressure of inimical environment, is set aside; and a new induction, discovered from an investigation of the life-processes, is enthroned in its place; and the contention is made that life is a progress, due to a plenitude of resources; and that the unfit do survive, even in dreadful diseases, without supplementary artificial aid, when simply made free to act in possession of their own constitutional endowments, in relation to any habitable environment. This is the essential law of the living body and of all progressive evolution. An organic body is in no sense the equivalent of organic chemistry. One is not equal to the other. All chemical analysis destroys life, though life uses chemical methods, but not mere chemical products, in its own upbuilding.

This biological position makes clear a line of demarkation between Osteopathy and the accustomed theories of medicine. It shifts the emphasis from mere drug supplementation, to the body itself, in living, possible relations; and rests its claims to rationality and success upon its own constitutional sufficiency. It holds to the philosophy of design, in its fullest extent, repudiates the assumptions of materialistic evolution, and lets nature speak and act for itself under the categories of theistic evolution. Concerning each and every part of the body, microscopic and macroscopic, it asks with scientific scrutiny, the following questions: (1) What is it? (2) What does it do? (3) How does it do it? (4) Why does it do it? (5) Does it fail to do what it is made to do? (6) Can the degree of failure be accurately ascertained? (7) What are the evidences of such failure? (8) Can the failure be partially or completely remedied? (9) What is the method of procedure in overcoming the failure? (10) Can the process of remedy be scientifically estimated? (11) What is the reliance and resource of remedy, and (12) Will the results be permanent?

The powers of bioplasm, cell, tissue, organ, and system, in their myriad relations and correlations, transmutations and differentiations, are minutely studied and pressed into service, in order to understand the life-history and action of a live human being, just as the inventor of automobiles calculates the tensile strength of iron, brass, copper, steel, and other materials, and fits each pipe, crank, and wheel to its intended function. Osteopathy reasons that if a structure is made and endowed to do a special work, and this structure may be known as capable of doing it, if it has ever done it under any conditions, and it does not do its work under a change of conditions, and these conditions are known, and the degree of defection from its proposed work may be ascertained, the only question remains, Can the structure be made to do the work it was formed to do, and may the conditions marking its failure be controlled to the end of restoring the original and specified functions? Osteopathy answers this question by a confident appeal to clinical experience, and maintains, philosophically, that this question cannot be settled by a formula of chemistry or a prescriptive or legislative jurisdiction over the body from without and foreign to its essential well-being, but that it is one purely judicial and executive, interpreting the meaning of the organism or structure, and eliciting its own internal operation. It is not competent to make a law alien to its own constitution and enforce it upon the organism contrary to its own spontaneity, however plastic it may be in a crippled condition; but rational and scientific procedure would dictate that the law already there be revived and set into operation by adjustment of the oppugnant difficulties. Osteopathy cannot but be a critique of chemical medicine, maintaining outright and on scientific grounds, that its principles, pharmacopœa, and practice are foreign to the body and antagonistic to its essential processes. Over against *materia medica* it posits, elaborates and defends the following germinal principles of the body, which are fundamental to every part of the body, separately and conjointly: (1) Its or-

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ganizing design, (2) its elemental potentiality, (3) its structural integrity, (4) its functional activity, (5) its mechanical adaptability, (6) its readjustive and restorative possibilities. These principles stated in propositional form announce the following great fact—that the living body is purposely organized and endowed, as a complete living structure, to formulate its supplies and secure its functions, by means of its marvelous mechanical adaptability, in order to recovery from disease and the establishment of itself in health.

Osteopathy does not cease to emphasize the essential reasonableness and resourcefulness of the living body, in all its parts and in the whole. It is altogether the ever changing result of final cause. The cause of the particular mode of existence of each and every part of the body resides in the whole and presides over the whole, and, consequently, the paramount importance of the normal adjustment of all the parts to the related whole, in order to ease and harmony of action. Anything else is disease. In dead masses each part contains the cause within itself. This explains a most important Osteopathic observation, that when any part is separated, more or less, from the organized whole, it generally degenerates in exact accordance with the degree and character of the separation, becomes diseased, and ultimately dies. Repair, recovery and cure depend upon reducing the separation and restoring the confluent action. An organized body is one and indivisible, and one part cannot suffer from obstruction and dislocation without the whole being affected. Continuity and contiguity of relation of each and every part of the body or a complete correlation of all the parts, is the prime condition of continuity and health of action. Every element of the body and the whole body, exists and acts according to a pre-established norm, and the whole body, being the sum of all the parts, realizes a full and finished ideal only when the norm of each is fulfilled in correlation with all the others. The method of procedure in Osteopathy, therefore, is the procedure of nature, and its efficacy as a therapeutic agency is based upon its knowledge and skill in re-establishing and maintaining the modes of nature's operations. These operations are not only ordained, but foreordained, and may be not only known, but foreknown. Indeed, uniform results may be predicted and secured with uniform certainty. For example, it is ordained beforehand, and may be foreknown, and predicted with certainty, that if corn is planted, wheat will not come forth. The farmer does not really *grow corn*, he only adjusts the materials and conditions. Even so, the physician does not *cure*, nor can he supplement the sufficient furniture of the body, any more than the farmer can add to the completed totality of a living seed; so the true physician, like the farmer, can, at best, only adjust the conditions. *Natura medicatrix morborum.*

Osteopathy does not minify the work of the physician by an appeal to nature, but seeks rather to magnify it; for all her processes are absolutely inimitable. The most advanced laboratory experimentalist cannot even understand, much less approach, her processes. Neither chemistry nor physics, in their newest claims can synthesize the elements so as to in-

duce of themselves vital phenomena. Much may be claimed for organic chemistry, which may mean, either the chemistry which living organs make or the chemistry that makes living organs. There is no chemistry that can make living organs. There is, therefore, nothing in the chemistry of drugs that can initiate, imitate, supplement or supplant, aid, keep or rightly stimulate, the life of the body or any of the life-processes. Such chemistry is dead; it not only cannot cure, but it is contrary to the law of cure. This is confessed in the formula both of allopathy and homœopathy. The *contraria contrariis curantur* of the one means, give a poison contrary to the physiological condition of the body. The *similia similibus curantur* of the other means, give a poison similar to the pathological condition of the body. Both are contrary to the body. Osteopathy works harmoniously with nature. As disease is produced within the circle of the natural working of the body, it must be reduced in the same circle, and by exactly the same forces that produced it, though under a change of conditions. Osteopathic practice consists in making this change. If design and purpose dominate function, and function determines structure—if purpose abides as an unchanging factor, then the only thing to be done is to manipulate structure in order to the maintenance of function. There is unity of substance and force both in health and disease, and this is the unity of nature, so cure must be effected by that which is natural to all the conditions; so Osteopathy says, *natura naturis curantur*. The same steam that drives an engine backward will drive it forward, on reversal of the lever. The same force that makes for health will make for disease, on reversal of natural conditions. No added material is needed in the boiler to make the engine go forward, when going backward—steam is assumed; so no added material is needed in the body to produce health when it is diseased—life is assumed. Drugs have no essential life. Action in drug-therapy is not the action of the drug, but of the body. Drugs could not act on a cadaver. The great question in therapeutics is not between an allopathic or an homœopathic dose—it is not a question of dose at all—the question is not what drugs do for the body, but what does the body do with the drugs? It invariably acts to get rid of them; and, action and reaction being equal and opposite, all "drug action" is followed by reaction, which is just the opposite.

The discovery and application of Osteopathic ideas is coeval with the great discoveries of physiology, chemistry, physics, and biology. Indeed, Osteopathy is the first formal and systematic application of the results of these experimental sciences to the conditions of disease. It stands almost alone in the application of the great facts of anatomical mechanics to the problem of health. It emphasizes throughout and thoroughly the anatomical utilities, and the physiological reserves. The mechanical contrivances most conspicuous in the living body—numbering nearly four hundred—constitute the leading Osteopathic disciplines, together with the purpose of their being and the laws of their action. The four basic principles considered are: (1) Function or purpose, (2) power as the efficient agent, (3) mechanism, by which

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the power is expressed and controlled, (4) manipulation, or management of mechanism in order to the productive results of cure.

The fundamental function of the body is circulation. The blood is the one great element to which Osteopathy looks, concerning which it takes the following positions: (1) The life is in the blood, (2) a normal flow of blood is health, (3) any obstruction to such flow is possible disease, (4) removal of such obstruction is scientific cure, (5) the means of such removal are supplied by the body itself, (6) this supply determines the method of procedure, (7) this procedure must be natural, (8) and, being natural, the results are permanent. The blood is studied under this logical order; natural flow, obstruction, congestion, chemical changes and toxoemia, infiltration, inflammation, suppuration, absorption, resolution or excision. The circulation of the blood depends upon muscle and nerve. Muscles, whether for motion or vasomotion, have the qualities of susceptibility, excitability, extensibility, contractility, elasticity, tonicity, rhythmicity, resistibility, flaccidity, rigidity, and tetanus. Muscles are controlled by nerves, and nerve-centres, which have specific powers, such as receptivity, conductivity, inhibition, acceleration, modification, re-organization, re-destruction, transmutation and intensification. As to direction and function, nerves are classified as afferent—running from all parts, external and internal, to the brain and centres—and efferent—running from the brain and the centres to all parts, external and internal, of the body; electrical, chemical, nutritive, motor and sensory. The function of sensation and the senses, is to convey to the brain and centres, impulses and information, concerning all conditions inside and outside of the body. The function of motion is to respond to such conditions, helpfully, happily, and healthily.

Failure in either line upsets equilibrium resulting in loss of communication and consequent disease. Every organ of the body is possessed of a special motor of its own, connected to the dynamic brain by two lines of conduction, one supplying and the other regulating power. Freedom of conduction of force and fluid is health. Nerve-control is seated in the brain, with sub-stations called centres, ganglia and plexuses, which distribute power and regulate control. So complex and marvelous is the control that it requires three systems to administer it, the cerebral, the spinal and the sympathetic. This control extends to every molecule—not a pin-point can be placed where it is not exercised. The body is made up of myriads of free, independent, active organisms, of the greatest diversity, in closest communication with one central unity—the brain; and through all this infinite variety one purpose reigns supreme. Osteopathy holds that the entire body in its blood, muscle and nerve systems, will act according to its specified design when free from obstructions. In virtue of this ruling purpose, Osteopathy conceives animals and plants as subject to disease; for disease takes place when the parts do not fully answer their purpose, when they do not do what they were made to do and ought to do. When design is unfulfilled, it is due to loss of structural integrity, for upon this depends proper func-

tional activity. Structural integrity, therefore, is, *par excellence*, the one condition of harmony of action, which is health. Upon what, then, does structural integrity depend, so that all these diverse parts may perform their varied functions, and be combined into the solidarity of the body? How is the body, composed of every thing, compacted into one thing? This is attained through the framework of the body. The bones constitute the prime tissue of the body as a mechanism. They give it solidity, contour, symmetry, form, position, motion, locomotion, resistance, relation, action. The whole body must gravitate or have weight, without which it could not stand securely, adapt itself to a changing environment, nor exert its powers upon itself or the bodies around it. But for this, muscular power, circulation and nerve action, and all the appliances which are related to these powers, would be useless. As the body must have weight to have power, so must it have a skeleton, in which also are the most admirable and remarkable adjustments and adaptations. The skeleton is the highest type on earth of mechanical efficiency. The body could not perform a single function without the bones. Every other tissue is so related to the bones that their position and action depend on them. They constitute a system of movable architecture, by which all other parts, from the most fluid to the most fixed, may move or be moved. The bones are not merely architectural, but architectonic; that is, they give structural unity, the union of all the parts of the body, which springs from the diversified principles upon which the body depends. Every cell, tissue, organ and system, depends upon the bones as a mechanical basis, for their orderly functions. From the lowest form of organized living existence—bioplasm—to the firmest tissue—bone—Osteopathy has studied, investigated and reasoned. Form, structure, function, relation, power, purpose, are the categories of its science, and as every science should take its differentiating principle, and even its name, from the essential body of its facts, so Osteopathy takes the bones as its essential and nominal factor. The name Osteopathy—*osteon*, bone, *pathos*, feeling, suffering—is, therefore, significant and scientific. It is descriptive of the science, and embodies the master idea of the science, as it does also of the bodily structure.

Having ascertained the form and law and power and purpose of the body and of its organic bases, having investigated the different parts of the body and viewed these in their relations as a whole, having seen how these relations are discharged in the united action of the body; and having embodied all these in its name, Osteopathy proceeds to lay down these propositions: (1) The law of life and disease and death is within the body, not without it; (2) The law of the organism should dominate the law of environment, rather than be dominated by it; (3) The body should assimilate the world to itself, and not be assimilated by the world; (4) The principles of initiation and spontaneity are superior to the state of passivity, reaction and plasticity; (5) The body is a process capable of action through its own potencies, rather than a product to be reacted upon by the formulations of the apothecary; (6) As

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the body is autotoxic and may produce within itself worse pathological conditions than can be made without it, so is it also autonic, and may reduce these pathological conditions; (7) The body is auto-biological, and auto-chemical and can produce better formulations within its own laboratories than can be made in commercial laboratories, and, so the body is also auto-therapeutic; (8) There are conditions of self-sufficient production, and there are, equally, conditions of self-sufficient reduction in all the processes that tend to disease or health; (9) If the body in a state of health is *de facto et in re* a biogen—a life-forming generator—and with a change of condition may become a pathogen—a disease forming generator—as in typhoid infection, where it is not the patient but the excreta that infects—and in turn this pathogenic patient may become through health a biogenic being, so the sciences of bacteriology and pathology are simply abnormal physiology, and pathogenic micro-organisms are really perverted biological entities; (10) In all "germ-disease" it is not the presence of the germ but the excreta of the germ that is directly related to disease. The germ itself may be one of the entities of the body—some cell—that has become diseased, and its excreta becomes the infection. Not all the problems incident to disease have been solved—indeed most of the vital ones are only guessed at, and the above propositions present the whereabouts of that intellectual activity that engages Osteopathic students.

The old ideas in these sciences which constitute the rubrics of chemical medicine, have been simply outgrown. Osteopathy stands abreast of all the advanced thought of the world in therapeutics, and leads the way in a new application of all the old facts, and in the newest interpretation of new facts. Osteopathy seeks, with crucible, reagent and dynamometer, to resolve all things in the body into a unity of substance and force, and, by the laws of its own constitutional action, to establish its true relation to heredity, habitat and habit, the great trinity of summative relations. Taken as a whole, the body is greater, stronger and more durable than any of its parts—than all of them when not working in harmony, and it is this transcendence of unit-power over the immanence of life, more or less, in all its parts, that gives the keynote of Osteopathic cure. Heredity at its best, or at its worst, or in any of its phases, is only an increment of the great law of tendency. The flow of a river from gentle current to dashing cataract may be likened to heredity, while the utility of this flow in waterworks, irrigation, steamships, electric power, may be culture. No one is born with a knowledge of the multiplication table, but all may learn it. Osteopathy is culture in all cases of inherited or acquired disease; and there are not many of either that do not yield to such culture. This culture consists of the capacity, power and adjustability of the organism, the correction of any or all defects either in the parts of the organism itself, or in its environment. The point of defect, obstructing free communicability, is called a "lesion" and such lesion is the first thing sought by Osteopathic examination, which is made independent of any statements by the patient in the way of giving symptoms, but which relies upon findings revealed by

thorough search of all conditions and their departure from the normal—just as a jeweler would examine a watch, seeking what he can find, and finding better than the owner of the watch. Such examination, when made, is confirmed by the personal history, and the symptoms given by the patient. That is, Osteopathic examination is not a consultation, but a diagnosis—a finding out what is the matter. Any obstruction to any force or fluid of the body constitutes the typical lesion. A lesion may be osseous, ligamentous, muscular or nervous. Such lesions are due to the untold compressions, concussions, contortions, compactures, contusions, congestions, constrictures, contractures, to which the body in a gravitational world is constantly subjected. The detection of these lesions is made by a trained touch (*tactus eruditus*) and an expert estimate of all abnormalities. This includes a careful anatomical, physical, and, when necessary, chemical and microscopical examination. Osteopathy exalts examination and diagnosis. A search for effects is made—departures of any kind from the normal; and the Osteopathist must know the normal. Then, a search is made for the causes, of the effects. Causes may be predisposing as well as exciting, and these causal conditions are always considered more important than the resultant symptoms. The old rule of medicine—look for symptoms and treat them as they arise—is displaced by the Osteopathic rule—look for causes, remove them and the symptoms will of themselves disappear. In Osteopathy it is not a question either of stimulation, inhibition, sedation or purgation; but it is all a matter of adjustment—correct the abnormality, which always has a mechanical equivalent. Work upon the mechanical or structural departure, and the effect will be physiological, that is, according to the law of the part affected. Osteopathic release, for example, of the pneumogastric nerve, as in the case of goitre, may regulate respiration, stimulate digestion and lessen heart action. Reduce the abnormality of structure, liberate the part, restore the normal and the result will be according to the law of the tendency—the part will do what it was made to do, and the tendency to act naturally is always greater than its opposite. Nature is tense to act naturally, and the only work to be done is to free all parts from obstruction, and natural action will follow. This natural action will be as diversified and effectual as the qualitative character and constitutional endowment of the part warrants, and the curative result will follow as surely as natural law. The only work of the physician is to free the mechanism from obstruction, and this work is primarily mechanical adjustment. This is essential Osteopathy.

The question arises: How may a wide range of effects, necessary to cure, be secured without extraneous aid? How may mechanical, thermal, chemical and electrical results be obtained without the use of apparatus, heat, drugs, or batteries? Osteopathy replies that the range of effects is as great by this procedure as by the ordinary method of medicine, and that the results are better—more natural and permanent. The only true effects are attained by Osteopathic methods—drug effects are imitative of the natural. They are destructive, while the natural are constructive.

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The rationale of Osteopathic method is as follows: (1) Everything in the body moves or may be moved. The body is like the body of a river, which lies upon the landscape with size, length, breadth, depth, and seeming solidity—it remains the same throughout the years, fixed, immovable, unchanging; and, yet it is fluent, moving, changing—at no one time is it exactly the same as at some previous or following time. Even so is the body, it is as fluent as a wave: moving, changing, quickening and slowing its flow, building up and tearing down all the time, taking on and throwing off its materials of supply, and, yet, through it all, it remains the same. The flow of a river may be hastened or impeded by regulating its channels—it may be made to sweep out its own accumulations. The body is a perfect mechanism in this respect. While everything in it moves, there is the most adjustable mechanisms to change and improve these motions.

The bones are the masterpieces of motion, and there is scarcely any limit to the changes possible through the leverages of the bones. This is Osteopathic mechanics, which is fundamental in theory and practice. (2) All motion, molar or molecular, liberates heat in exact proportion to the mass and degree of motion. There is no part of the body where temperature may not be immediately changed, either in chill or fever, by mechanical adjustment and manipulation. (3) All heat is a chemical action; so motion induces chemical changes: and quick reactions, as decisive and calculable, are secured by Osteopathic methods, as may be had in any laboratory; and as there are chemical nerves, so there is no known chemical product that may not be made in the body by properly using the means therein supplied; and all needed reactions, that cannot be approached, much less imitated, by the laboratory, are produced on demand. This is Osteopathic chemistry, which it is the office of "physiological chemistry" to understand. (4) The action of nerve on muscle is electrical—Osteopathy holds to the electrical interpretation of physiological phenomena. The brain is a battery, the double line of nerves everywhere are conductors, the organs have subsidiary motors, the spine is a switchboard, the centres are the points of control for nervous impulses, the positive and negative ions everywhere are the electrical units, the blood is the common carrier of materials used in the generation of nerve power, and the current that acts and reacts over the nerves and through the muscles and in the blood, is like electricity. All nerves are insulated, and all nerves must be free to act. Pain is the physiological danger-signal. Its function is distinctively to give information of obstruction along the lines, and it is of inestimable diagnostic value. To deaden the pain by drugs is to destroy the signal. Osteopathy saves the signal, heeds its warning, by removing the obstruction. If the obstruction is not removed, the response of nature is by a spasm; for a spasm is a motor shock initiated by the centres to remove obstructing barriers. It, also, is physiological. When the organism is in intolerable suffering or imminent danger, from pain or spasm, Osteopathy believes in the emergency-treatment by means of anæsthetics, antidotes and antiseptics; and it is just here that

Osteopathy stands related to surgery. Osteopathy is surgery—scientific chirurgics. It is adjustive, fixative, manipulative surgery, just as when bones are broken, the only work necessary is to adjust the severed parts, secure them in conjunction, until nature heals the parts. This is exactly the case with all other tissues when broken, dislocated or in any way out of proper adjustment; but when the parts are mutilated, suppurated or putrefacted, beyond the power of nature to restore, then knife-surgery would be resorted to in the usual way, though the methods of Osteopathy make the use of the knife unnecessary in many cases.

In addition to surgery, there are other means that Osteopathy might use as a matter of common sense, such as hot and cold packs, and a large class of accessories that are neither chemical nor Osteopathic. Osteopathy does not deny that certain definite effects follow the administration of drugs, but holds that these are in no way curative. There is a certain molecular constitution of all tissues that permits alcohol and poisons to penetrate between the inter-molecular spaces and by outright antagonism of the life-combinations, to stir up activity. The cells are aroused to fight for their life, either by combining in warfare against the drug, or by withdrawing their axis-cylinders and retracting within themselves, and lapsing into quiet until the intruding poison has been absorbed or neutralized. If there is vitality enough to re-establish the life-combinations after the attack of the drugs, there may be new conditions instituted that may be interpreted as improvement; but it is always at the expense and peril of life. Scientifically, drug-therapy is chemolysis, which means a breaking up of the living cell-combinations of the body by poison. Chemolysis is biolysis, or the destruction of living combinations. It is about equal to paralysis.

Osteopathy discards electricity, for the same reason—it is electrolysis, or electrocution. Radioactivity has the same effects. It is possible to electrify the tissues, to potentialize them, and even to make them radiant, but in it all there is no increment of life or enduring strength; the effects are exhaustion and dissolution. Such potent elements as oxygen and electricity are beneficial only when taken as organized naturally in air, sunshine, water and food. Hygiene and dietetics hold an important place in Osteopathic methods, but only in the ordinary way of means and materials of invigoration and supply. Massage has no connection with Osteopathy, and is never given by an Osteopathic physician, but is recommended in some cases, though it is scarcely needed with Osteopathic treatment. Patients, however, are directed into a regimen that supersedes all such passive methods as are in vogue as adjuncts of the ordinary medical practice.

Osteopathy is not mere manipulation, but is differentiated from all manipulative methods in the following respects:

(1) The Osteopathic physician makes an examination of the entire condition of the patient, without question, in order to ascertain the exact facts of abnormalities.

(2) He makes his diagnosis from such objective facts, and reasons from causative conditions to resultant effects.



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- (3) He gives the symptoms to the patient.
- (4) He accepts all cases upon his own diagnosis, and treats them independently.
- (5) His treatment is primarily addressed to the correction of structural defects.
- (6) His results are natural and permanent, because the resources of cure are all the patient's own.

Osteopathy is, therefore, a new kind of therapeutics, separate from, and independent of the system of medicine. It covers in its comprehensive view the whole field of practice, including surgery and obstetrics, in which it has had signal success. It remains finally to expound the philosophy of Osteopathic methods in practice. It is more than manipulation. It is really adjustment. While the hands are used, it is not this alone and chiefly that constitutes its method of operation. It is engineering, in the highest sense. It is above the plane of "movements"—for there are no movements—no more than in bridge-building. The great principles of construction and production, the efficient action of multitudinous parts dependent on construction, the establishment of complicated processes in an interminable circle of causes and effects, all issuing in one united result—health—all these underlie the Osteopathic idea of adjustive manipulation. It is the idea and purpose that lie behind the manipulation. Osteopathy says: Do nothing till it is known what is to be done, why it is to be done, how it is to be done, and what is expected will result from the doing. These things, it maintains, are definite, practicable, calculable, predictable, natural: that is to say, the Osteopathic operator works to produce specific results and holds that this production is a matter of law. Corn planted, is an intelligible operation, and its culture produces measurable returns. An Osteopathic treatment given, is as much a matter of intelligence, and with the same kind of results. An Osteopathic operation is fundamental and actual production, and this production is according to known and demonstrable laws; and adjustment is the method by which these laws become evident and effective. Its great discovery consisted in a new relativity between structure, power and function. The formal elements of this discovery are (1) A simple fact or general law of power. All cure implies power—sufficient power. This power resides in the body alone. All admit this, but Osteopathy first relied upon this power without extraneous aid. (2) A correlated fact or specialized law of production. Results are secured through the utility of this power, in special ways never before known or attempted. Treatments produce results, not in an empirical or haphazard way, but according to laws. (3) An adapted mechanism through which the power produces the desired result of health. One says: "I do not see how you can treat dyspepsia without medicine." The same one may say: "I do not see how you can telegraph without wires." There are many mechanisms in the world not commonly understood. The living body is one of them. Experiment and experience may make everything plain. It is just as easy to get results in the stomach or heart as it is to ring

a bell in the kitchen from the outside front door. Rubbing the door would not do it, but pressing the button might, if the double line of wires was in proper condition and relation with the battery—if the contact in the button was made, and the clapper of the bell was properly adjusted. To insulate the contact, twist the clapper out of relation, or break a wire, would be to impair the mechanism. Repair is adjusting the mechanism to do its intended work. The action of the heart, stomach, intestines, liver—the secretions of organs, etc., can be secured in the same way. Impaired action of any part of the body in relation to other parts is overcome by repairing the mechanism to do its purposed work. (4) The process of adjustment, by which the mechanism is repaired, adjusted, fitted to the power to produce the conditions of cure. This is the *technique* of Osteopathy, and is acquired by Osteopathic physicians after two years of practical work in a large clinic. Like the technique of any art, music, painting, surgery—it becomes facile and finished through practice. The elements of the law of results in Osteopathic art, are the same as in all arts. It is the law of production that grounds all science and art. All progress and achievement are attained by realizing the relativities between material supplies, power, and use, and by manipulating these factors in a scientific and artistic way. The artists who realize their ideals and become masters in music, painting, song, oratory, literature, have specialized power; and they put it to use—this is function. They achieve the relation between them and manipulate instruments, paints, voice and language, and secure great ends. In the botanical world, untold wonders are accomplished by manipulating flowers and fruits, in order to get new species, new flavors, richer products. The work of the California horticulturist is evidence of this great law of production through manipulation. In the animal realm, the most potent forces are awakened and manipulated, so as to change both form and function. The trainer and breeder of animals and fowls demonstrates this. He perceives the power, uses the mechanical organism, and by manipulation, secures marvelous results. New functions are developed from the old powers, and so great is the production that specific changes which are permanent and transmissible, are attained. Then, too, men manipulate men. Youths are fitted—manipulated—for army, navy, bar, pulpit, politics. Education is not putting facts or materials into the mind, but drawing out its own inherent and latent powers. The power to think one thought is worth more than a thousand thoughts. With the power of thought developed, one may think out and penetrate his universe for himself.

There is a still loftier and more wonderful function which all may exercise, both in the sphere of the body and of the higher nature—the work of transforming and reforming, that is, to all intents and purposes, truly forming each his own physical, mental, and even moral nature. This power is well-nigh incalculable, and it makes for the best results in health. Any one may break through a customary or established habit, even though interwoven with the intimate fibres of his own life, arrest a downward tendency, and press forward toward a re-

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newed and a restored condition. All this illustrates the great laws of production that have made possible the great movements of modern progress. All these processes demonstrate the powers and possibilities of productive manipulation. Every one acknowledges these principles when they are pointed out. Take electricity, for example, an unlimited power, everywhere present, accessible, manipulable, calculable—the one problem is to utilize it for practical purposes, and there is scarcely anything it may not do. The mechanisms and methods of using it are varied, and will be even vaster in the future. So Osteopathy has discovered a practically unlimited power in the living body, it has demonstrated that this power is all-sufficient for purposes of health, it has found this tremendous, though mysterious power intimately permeating every atom of the body and constituting its very life—that this power has built for itself and constantly maintains and renews, a marvelous and complicated system of mechanisms, each complete and independent, though co-ordinated into a federal unity—that it is furnished with a perfect armament of supplies and reserves for perpetuating itself and resisting all attacks, foreign or hostile to its vital interests; that the purposes of its creation are always attained when the integrity of its several parts is preserved in sympathetic relations with its essential unity; that the supreme court of this ideal body has made it the essential law of its constitution, that each part severally and all the parts unitedly, are entitled to life, freedom and the pursuit of health; that this life, freedom and health are impaired when its structural unity is lost, and that to restore the unison, or health, is to bring the sectional parts together into harmonious relations; that health is altogether a matter of internal improvement and physical reciprocity, with incidental protection against dangerous influences, accidents and emergencies. Osteopathy has discovered, demonstrated, developed and defended this distinctive doctrine of American therapeutics, as an application of the reasoned principles of all true production and progress to the distress and disease of suffering humanity, and has achieved such helpful and healthful results, confessed by the testimony of such a mass of intelligent people, as have made it phenomenal and without a parallel in the history of therapeutic science.

Osteopathy preaches and practices the doctrine, that it is the function of the true physician to treat the people in such a way that they can get along healthily without him, and it is true that when people get well by its methods—naturally—they stay well; for it is not only curative, but preventive. One of its widest ranges of usefulness lies in its powers of prevention. The physical structure can be put into natural and healthful condition, without drugs, and it is the tendency, when naturally adjusted, to remain so; and much of the practice of Osteopathy, after its corrective work, is to keep the body normal and healthful. This is comparatively easy, for it is easier, more sensible and scientific, to keep well when well, than to get well when sick. It is also more economic in every way to prevent a break-down than to repair one. Millions are spent all the time to prevent accidents; and intelligent people are

even now using Osteopathy as prevention, and the time seems near when under its teaching and results, the entire body will be examined regularly with a view to keeping it in perfect order to prevent sickness, just as now the teeth are looked over regularly to prevent their decay.

For the facts of its history, development, institutions, literature, and law—all of which point to a remarkable life and a growing expansion—see article which follows.

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**Osteopathy, Its Discovery, Development and Institutions.** Any new system develops to recognition as its principles become systematized and organizations are established to formulate, teach and enforce these principles in practice. Andrew Taylor Still was the discoverer of the new Science of Osteopathy. He was a practising physician of the regular school, a surgeon under General John C. Fremont and in the volunteer corps of the union army during the Civil War. He first formulated his idea about 1874, and from that time till 1887 itinerated from place to place in the State of Missouri applying his system in the treatment of the sick. In 1887 he settled in Kirksville, Mo., and from that time on Dr. Still's work was associated with Kirksville. After practising the system himself for some years, his work consisting largely of setting dislocations, the lightning bone-setter as he was called, a demand arose for facilities to impart this information to others. At first it was supposed that Dr. Still had some miraculous gift. He himself, however, maintained that others could do the same work and get similar results.

The development of Osteopathy is inseparably linked with the colleges, associations and the literature that has sprung up around the new system. Dr. Still was a practitioner rather than a teacher, and his ideas of instruction were antagonistic to existing methods and curricula. At first he taught the methods of his system to his sons. The first charter of the American School of Osteopathy was granted 10 May, 1892, Dr. William Smith being the first teacher. The sum and substance of the new philosophy of Dr. Still, as stated in his 'Autobiography' (p. 218), is, "That a disturbed artery marked the beginning to an hour and minute when disease began to sow its seeds of destruction in the human body. . . . The rule of the artery must be absolute, universal and unobstructed or disease will be the result." As to his plan of therapeutics, he says, "all the remedies necessary to health exist in the human body. . . . They can be administered by adjusting the body in such condition that the remedies may naturally associate themselves together" (Ibid, p. 100). As to the etiology, diseases are effects, "The cause can be found and does exist, in the limited and excited action of the nerves only, which control the fluids of parts or the whole of the body. . . . All diseases are mere effects, the cause being a partial or complete failure of the nerves to properly conduct the fluids of life" (Ibid, p. 108). These were the fundamental principles taught by Dr. Still. He named the

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system Osteopathy, because the relations of all the body structures are determined by the skeletal framework and this is the key to the processes of adjustment.

In 1894 a new charter was granted the A. S. O., in which the purpose is expressed, "To improve our present system of surgery, obstetrics and treatment of diseases generally, and place the same on a more rational and scientific basis, to impart information to the medical profession and to grant and confer such honors and degrees as are usually granted and conferred by reputable Medical Colleges." The first class graduated March, 1894. The course was then two terms of five months, anatomy and practice being the curriculum. In 1897 the course was lengthened to four terms of five months and included all the subjects taught in regular medical colleges, except *materia medica* and operative surgery. In September, 1905, the A. S. O. adopted the three-year course. Over 3000 students have graduated from the American School of Osteopathy. C. M. Turner Hulett, J. Martin Littlejohn and George M. Laughlin have held the office of Dean of the Faculty.

Other colleges have been organized and these have been important centers of research and investigation in the development of Osteopathy. Among these other colleges the following are recognized at present by the Associated Colleges and the American Osteopathic Association: Pacific College of Osteopathy, founded May, 1896, Los Angeles, Cal. Southern School of Osteopathy, organized March, 1898, Franklin, Ky. California College of Osteopathy, founded in 1898, San Francisco, Cal. Massachusetts College of Osteopathy, founded October, 1898, Boston, Mass. In 1903 this college began the three-year course of nine months. Philadelphia College of Osteopathy, Philadelphia, Pa., organized 1899. The American College of Osteopathic Medicine and Surgery, Chicago, Ill., was organized in May, 1900. The College charter, which represents the only recognition of Osteopathy in Illinois, requires entrance qualifications equivalent to those of the American Association of Medical Colleges. It also requires "the maintenance of an independent medical school or system or method of healing, applying and teaching the osteopathic theories of diagnosis and therapeutics, surgery and obstetrics, so as to maintain the same as an independent system or science of healing." In 1900 the college organized a two and a four-year course, the latter covering the complete course in Osteopathy and Surgery. Several colleges have been absorbed after remaining in existence for some years, the Northern Institute, Minneapolis, Colorado College, Denver, Milwaukee College, Dr. S. S. Still College, Des Moines, and the Atlantic School, located first at Wilkes Barre, Pa., and later at Buffalo, N. Y.

The development of Osteopathy is associated with the establishment of high standards of education. In 1897 the course was one of four terms of five months. The subject of extending the course was under discussion for several years. In 1901 a paper was read before the annual convention at Kirksville, Mo., on the subject of 'Osteopathy, Coextensive with the Science and Art of Healing,' by J. Martin Littlejohn. In 1902 the Committee on Education of the A. O. A., consisting of C. M. T. Hulett,

E. R. Booth and W. B. Davis, reported "that the minimum course should be three years of 36 weeks, of 720 recitation periods actual time in each year. When surgery is taught another year should be added, making a four-year course, embracing the entire field of healing, except drug therapeutics." In order to organize the reputable colleges and bar incompetent schools, the Associated Colleges of Osteopathy was organized in 1898, with a definite plan of education and entrance requirements. In 1901 the new constitution of the American Osteopathic Association incorporated the Associated Colleges of Osteopathy as an integral part in the National Association. The executive committee of the A. C. O. and the educational committee of the A. O. A. being a joint committee on the membership, supervision and examination of colleges. Thus in the development of Osteopathy there is a professional and an educational organization for the promotion of Osteopathy, the elevation of the standards of the colleges and to exercise supervision so as to improve these standards in the reputable colleges.

The standard recommended by the A. O. A. in 1902 is as follows: "Laboratory work to lay the foundation, supplemented by lectures and text to broaden the field and by quizzes to fix the knowledge. Anatomy, five hours per week for three terms (five months' term); Biology, three hours per week, one term; Embryology, two hours per week, one term; Histology, five hours per week, one term; Chemistry, five hours per week, one term; Pathology, four hours per week, one term; Physiology, five hours per week, two terms; Neurology, two hours per week, one term; Principles of Osteopathy, five hours per week, one term; Diagnosis, five hours per week for two terms; Therapeutics, five hours per week, two terms; Gynecology and Obstetrics, three hours per week, one term; Minor Surgery, two hours per week, one term. In addition Psychiatry, Jurisprudence, Professional Ethics, Sanitation and Dietetics should be included."

As the number of graduates increased and as demands for legislative action appeared, it was felt that the Osteopaths must organize to preserve their unity and to maintain the system intact against opposition. The medical profession was already well organized. Small State societies were the first formed for mutual aid in defense of individuals and to defend the system in the legislatures. This led up to the idea of a united organization, the Osteopathic profession organizing a National Association, called at first the American Association for the Advancement of Osteopathy, 6 Feb., 1897. The first annual meeting was held 19 April, 1897, at Kirksville, Mo. Since then the Association has met annually and at present consists of over 1,000 members, representing legitimate Osteopaths all over the country. All reputable practising Osteopaths are eligible to membership. In 1902 the name was abbreviated to American Osteopathic Association. The principles and practice of Osteopathy have received careful attention in the papers and discussions and clinics each year. The executive control is vested in a board of trustees and three standing committees on legislation, education and publication. The Education Committee conjointly with the Associated

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Colleges of Osteopathy supervises the standards of education and the recognition of reputable colleges. In 1904 the Associated Colleges adopted the standard of a three-year course. This was enforced by the National Association in 1905. The Committee on Publication has supervision of the publication of the official Association Journal, started in September, 1901, under the editorship of A. L. Evans. It is now a monthly Journal containing reports of the annual meeting, papers read at these meetings, etc. In connection with the Journal a supplement is published under the editorship of Edythe Ashmore, containing reports of cases. The A. O. A. has done much good work for the advancement of Osteopathy. In 1899 it was resolved to raise the standard of equipment "until it shall include every department of therapeutic equipment, with the exception of Materia Medica." An organized campaign was adopted in 1901 against the correspondence schools of Osteopathy. In 1903 E. R. Booth inspected all the reputable schools, reporting favorably on the work done and the earnestness of the student and teaching bodies. An Osteopathic year book, containing a directory of the profession, was published in 1904 and 1905.

In 41 of the States and Territories of the Union there are State societies, and in most of the larger cities local societies devoted to the advancement of Osteopathy. In some States, like Illinois and Pennsylvania, the State is divided into districts for closer organization and more effective association. There are at present over 4,000 reputable Osteopaths and about 1,200 students. An Association of State Boards of Osteopathic Examiners was organized in 1904 to cooperate for the establishment of uniformly high standards of educational requirements.

Part of the development of Osteopathy is associated with the sanitarium. As practice widened acute cases called for special care, and those requiring special surgical attention had to be kept under constant supervision. Among these the most prominent are A. T. Still Sanitarium, St. Louis, Mo., Cambridge Osteopathic and Surgical Sanitarium, Mass., Drs. Littlejohn Sanitarium, Chicago, and the Sanitaria at Des Moines, Ia., Adrian, Mich., and Freeport, Ill. A new sanitarium is in process of erection at Kirksville, Mo.

The development of Osteopathy is best seen in its literature, which has been voluminous. We find all classes of literature here from the patent medicine peculator type up to the scholarly and scientific defense of the system. The first place is due to the works of A. T. Still, on 'The Philosophy of Osteopathy' and 'The Mechanical Principles of Osteopathy.' The other works are mentioned simply as an index of the growth of the system. Barber, 'Osteopathy Complete'; Booth, 'History of Osteopathy'; Clark, 'Diseases of Women'; Davis, 'Osteopathy Illustrated'; Henry, 'Osteopathic Therapeutics and Diseases of the Eye'; Goetz, 'Manual of Osteopathy'; Hulett, G. D., 'Principles of Osteopathy'; Hazzard, 'Principles of Osteopathy and Practice of Osteopathy'; Laughlin, Wm. R., 'Anatomy in a Nutshell'; Littlejohn, J. B., 'Note: on Histology and Pathology'; Littlejohn, J. M., 'The Science of Osteopathy'; 'A Treatise on Osteopathy'; 'Osteopathy: What It Is'; 'Physiology'; 'Physiological-Psychol-

ogy'; 'Psycho-Pathology'; 'Osteopathic Therapeutics' (notes for his students); McConnell, 'The Practice of Osteopathy'; Proctor, C. W., 'General Chemistry and Physiological Chemistry'; Pressley, 'Basis of Osteopathy'; Riggs, 'Theory of Osteopathy and Manual of Osteopathy'; Tasker, 'Principles of Osteopathy'; Woodall, 'Osteopathic Gynecology'; Young, 'Surgery.' Charts have been published by Littlejohn (J. M.) and Dunnington, Smith (A. M.), Helmer (G. J.), Eales and Taber and Welsh.

Quite a number of Journals have been published, from time to time, devoted to the discussion of the principles and practice of Osteopathy. The first issued was the 'Journal of Osteopathy,' Kirksville, started May 1894. Among others to be noted are 'The Journal of the American Osteopathic Association'; 'The Journal of the Science of Osteopathy' (1900-03); 'The Osteopathic World'; 'Cosmopolitan Osteopathy'; 'The Popular Osteopath' (1899-1900); 'American Osteopath' (1899-1901); 'The Osteopathic Physician and Osteopathic Health'; 'The Massachusetts Journal,' and 'The Osteopathic Year Book' (1904-05).

*Resumé of Legislation and Court Decisions.*—In an opinion delivered by U. S. Justice Field in the Supreme Court, sustaining the constitutionality of the health laws, we find the recognition of the possibility of new modes of treating disease being discovered. "The same reasons which control in imposing conditions, upon compliance with which the physician is allowed to practice in the first instance, may call for further conditions as new modes of treating diseases are discovered." (Dent vs. W. Va., 129 U. S. 114.) Here we have the recognition of the battle ground for Osteopathic recognition before the legislatures and in the courts. When Osteopaths began to practise they were met by threatened arrest, and frequently by arrest and trial as violators of law. To meet this condition, legislation was asked in some States and judicial protection secured in others. The details of how the result was achieved cannot here be recorded. The first legislation asked and secured was special recognition of the graduates of the new system in the practice of their profession, the practice of Osteopathy being declared not the practice of medicine under existing laws. The first statutory recognition of Osteopathy was passed by Vermont in 1896, in which graduates of the American School of Osteopathy were granted the right to practice in the State. Missouri next passed a law in 1897, a former bill having been vetoed in 1895, recognizing graduates of a course of four terms of five months, Osteopathy being defined as "a system, method or science of treating diseases of the human body." State after State followed with similar legislation. In 1901 two important changes in legislation were made. (1) Montana and California created State Boards of Osteopathic Examiners, providing for examination and license on the basis of demonstrated qualification. (2) Wisconsin passed a law recognizing Osteopathy and providing for an Osteopathic physician on the State Board of Medical Examiners. Twenty-seven States recognize Osteopathy in some form. Of these, Wisconsin, Indiana and Kentucky place a member on the Board of Medical Examiners, the law in Ken-

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tucky declaring Osteopathy the practice of medicine. Texas, Colorado and Maryland exempt Osteopaths from the provisions of the medical laws. Independent boards of Osteopathic examiners are granted in Missouri, Vermont, Michigan, Tennessee, Montana, California, Connecticut, Minnesota, New Mexico, Oklahoma, Arkansas and Ohio (a committee of the Medical Board examining on Osteopathic subjects and recommending to the Medical Board). North Dakota retains the original law. South Dakota, Iowa, Kansas, Nebraska and Virginia provide for the granting of certificates to practice Osteopathy by the State Board of Medical Examiners, Kansas and South Dakota on presentation of diploma and the others on examination. In Illinois no recognition is given to Osteopathy, but those who practise any other system or science of treating ailments who do not use medicines internally or externally and who do not practise operative surgery may get a certificate "to treat human ailments" by examination before the State Board of Health, but no educational qualifications are required.

Osteopathy before the judicature may well represent the climax of development. When the question of Osteopathic status came before the courts there was no precedent to depend on. Osteopaths appear on the defensive, charged with practising medicine under the laws governing the practice of medicine. Some of the courts have decided that Osteopathy is the practice of medicine, others that it is not, according to existing laws. Osteopathy was a new system, not in existence when these laws were passed. Hence it was reasonable to argue that it was not the practice of medicine according to existing laws. The Supreme Court of Kentucky in the celebrated *H. E. Nelson* case, 20 June, 1900, (57 S. W. R. 501) granted a perpetual injunction against the State Board of Health, restraining it from interfering with or prosecuting Osteopaths for practising their profession. In the opinion we find, "Osteopathy is a perfect system, having the approval of skilled and scientific men, and schools and colleges in which its doctrines are taught. . . . Appellant may not prescribe or administer medicine or perform surgery, but so long as he confines himself to Osteopathy, without the use of medicine or surgical appliances, he violates no law and appellee should not molest him." The Supreme Court of Ohio, in the case of the *State vs. Liffing*, sustained the defendant's demurrer that there was no cause of action, declaring that Osteopathy is not the practice of medicine under the law, the attempt to regulate Osteopathy being prohibitive and therefore unconstitutional. The Supreme Court of New Jersey in the case of the *State vs. E. M. Her-ring*, declared that, "An Osteopathic physician whose treatment of his patient consists simply of manipulations of the body does not violate the provisions of the Act of 22 May 1894, which forbids the applying of drugs, medicines or other agency or application by an unlicensed person." The Court of Errors and Appeals, New Jersey, 5 May 1905, affirmed this decision. The Supreme Court of North Carolina in the case of the *State vs. McKnight*, 1902, (S. E. R. 46, 401) declared "The practice of Osteopathy is not the practise of medicine and surgery, and no

license from the Medical Board of Examination is required." Mississippi Supreme Court in the case of the *State vs. Hayden*, 1903 (33 S. R. 653) affirmed the same point. A similar effect in decision of Supreme Court of Utah, in *State vs. Hibbs*, 1904. In the State of Nebraska, the Supreme Court, in the case of *State vs. Little*, 1901, declared the practice of Osteopathy the practice of medicine. The Appellate Court of Illinois, Nov. 1896, in the *State vs. E. H. Eastman* (71 Ill. 236), later approved by Supreme Court in *State vs. Gordon*, the Supreme Court of Alabama in *State vs. E. E. Bragg*, 1901 (Ala. 6 Div. 479) declare that the practice of medicine includes "All persons who diagnose diseases and prescribe or apply any therapeutic agent for its cure." The Supreme Court of Ohio, in the case of *State vs. Henry H. Gravett*, 1901, (55 L. R. A. 791) declared that the medical law includes Osteopathy, but the existing regulations of Osteopathy are unconstitutional on account of discrimination.

The explanation of this diversity of opinion is to be found in the fact that all the decisions have been based on statutory construction. In Kentucky the statute was construed to apply only to those practicing when the law was passed. This is the correct view, because as the Supreme Court of the U. S. declared, new methods require new conditions. This calls for its acceptance as a system of equal standing with the other systems and especially calls for recognition by the State Boards of Health.

In line with this we find the courts accepting Osteopaths as competent to give expert testimony (*Hyatt vs. Traction Co.*, Toledo, Ohio, May 1902). The Supreme Court of Missouri, 1905, in the case of *Granger vs. C. E. Still*, decided that medical doctors are not competent as experts relative to the Osteopathic system of practice. Legislation and judicial decision have thus gone hand in hand in giving legal status to Osteopathy and placing it within the pale of the science and art of healing as a reputable system of practice.

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**Osteostraci.** See OSTRACOPHORES.

**Osterhaus, Peter Joseph.** German-American military officer: b. Coblenz, Germany, about 1820. He emigrated to the United States, and at the outbreak of the Civil War joined the Union army in which he was given rank as major of volunteers, subsequently attaining the rank of major-general, and serving as chief of staff under Gen. Kirby Smith. He acted as United States consul at Lyons, France, after the War, but ultimately returned to Germany, where he engaged in manufacturing business.

**Osterman, Os'ter-man, Rosanna Dyer.** American philanthropist: b. Germany about 1816; d. in a steamboat casualty on the Mississippi 2 Feb. 1866. Her wide charity and unselfish character made her a unique figure in the annals of Southern womanhood. During the Civil War she was a daily visitor at the Galveston hospitals, giving of her bounty to every sufferer. The Osterman building in Galveston, a monument to her benevolence, was bequeathed by her to the poor of all creeds. At her death

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the bulk of her large fortune went to Jewish and general causes.

**Ostia**, ōs'tī-ā, Italy, an ancient city, formerly the port of Rome, at the mouth of the Tiber, six miles from Rome by the Via Ostiensis. It was founded by Ancus Martius, who established salt-works at its site, which long continued to supply Rome and the neighborhood. Ostia also supplied Rome with corn from Sicily and Sardinia. It was not, however, till the wars with Carthage rendered it of importance as a naval station that it appears in history.

The decline of Ostia appears to have been due to the constant filling up of the river, from which its site is now two or three miles distant. Claudius constructed a new harbor with great labor about two miles north of Ostia, which communicated with it by a canal. It was called the Portus Augusti, and afterward, when enlarged by Trajan, the Portus Trajani. The new port became the seat of a town called Portus Ostiensis or simply Portus. It communicated directly with Rome, and soon began to encroach on the trade of Ostia, which, however, continued to flourish until its destruction by the Saracens in the 9th century. Its ruins are about half a mile below the modern village, founded by Gregory IV. in 830, and strongly fortified, which is now a place with about 1,000 inhabitants. The ruins of Portus are on the right bank of the Fiumicino, about two miles from the coast.

Modern excavations at both places have revealed a number of interesting remains of ancient public buildings, temples, shrines, and tombs.

**Ostiaks**, ōs-tī-āks', a primitive Finnish race who dwell in the Siberian governments of Tobolsk and Tomsk. They consist of three tribes, distinguished from each other by customs and language. Their language, of which the dialects are numerous, is classed as a branch of the Samoidic, a language of Turanian stock. At present their aggregate amount may be estimated at some 100,000. Of uncertain origin, though possibly Mongolian stock, are the Siberian Yenisei Ostiaks, on the Yenisei, between the Upper and Lower Tunguska. They speak an entirely different language from all the other Ostiaks, and for a long period have completely adopted Mongolian customs.

**Os'tracism** (Gr. *ostrakon*, shell), an ancient mode of judgment by which, according to the Athenian law, a citizen was consigned to banishment. It was not a punishment for any offense actually committed, but a precaution against the projects of personal ambition and the excessive growth of individual power and influence. When it was decided by the popular assembly and senate that a citizen should be banished, no name being mentioned in the preliminary discussion, the voting took place in the following manner:—A place in the *agora* was enclosed by barriers, with ten gates for the ten tribes. By these the voters entered and deposited their votes, written on a shell or piece of tile. The archons counted the votes, and the person against whom the majority was given, provided it amounted to more than 6,000 votes, was obliged to leave the city within ten days. The period of banishment was usually ten years. Ostracism did not include forfeiture of property.

Among the distinguished persons ostracized were Themistocles, Aristides, and Cimon, son of Miltiades.

**Ostraco'da**, an order of *Entomostraca* (q.v.) or small *Crustacea*, in which the body is unsegmented and completely enclosed in a bivalve shell or carapace. The shell is attached to the body only on the dorsal side, where there is an elastic divaricating ligament whose action is opposed by an adductor muscle. When the valves are opened seven pairs of appendages are exposed. These are two pairs of antennæ, a pair of stout chewing mandibles, two pairs of maxillæ and two pairs of locomotory legs. All of these appendages except the mandibles are more or less concerned with swimming and creeping. Besides tactile organs there is a median eye and sometimes a pair of eyes. The sexes are always separate. Sometimes the eggs are carried within the female's shell, but usually are deposited on water plants. The young pass through a nauplius stage with three pairs of appendages, but are peculiar in the presence of a bivalve shell. Numerous species inhabit both fresh and salt waters and many are known in the fossil state. The most frequent are the species of the fresh-water genus *Cypris* (q.v.), lively little animals found in great numbers in ponds and aquaria. *Cypridina* is marine, and has the shell excavated in front to permit the passage of the very prominent antennæ. It has both paired and median eyes and a large heart. Consult Packard, 'Zoology' (1897).

**Os'tracoder'mi**, a suborder of plectognath fishes, according to the classification of Jordan (see ICHTHYOLOGY), composed of the trunk-fishes, puffers, porcupine-fishes, and their allies, which have the body "enclosed in a three-, four- or five-angled box or carapace, formed by polygonal bony scutes, firmly jointed at their edges," and are without a spinous dorsal fin.

This term has also been used as a synonym of Ostracophori (see OSTRACOPHORES).

**Ostracoph'ores**, a subclass of small fishes (*Ostracophori*, or *Ostracodermi*), composed of very early Palæozoic forms with persistent notochord, and endoskeleton not calcified; mandibles and arches for the paired fins are apparently absent. The exoskeleton was well developed, and the head and anterior portion of the trunk was usually covered with plates, which in many form solid and extensive shields, making the fish look much like a horse-shoe crab; indeed the remains of many were at first mistaken for those of crustaceans, arachnids, or even gigantic beetles. The mimicry of the contemporary eurypterids (see EURYPTERUS) was very close. Louis Agassiz first recognized them as fishes. None of these fossils exhibit the slightest trace of ordinary jaws, or of a segmented axial skeleton in the trunk, or arches for the support of paired limbs. The dermal armor is remarkable for the extent to which vascular spaces are developed in its middle layer; in the oldest and simplest forms no bone-cells have been found in any part of the armor. There is always a shield covering the top of the head, and usually another over the abdominal region; and opposed to the latter is a ventral armature which meets the dorsal plate at each side in an open suture. The tail seems always to have been flexible, though scaly in some species. The mouth, according to Wood-



ward, must have been on the ventral side, with the nasal sac or sacs just in front of it. The gill-pouches opened outwardly into a covered space communicating with the exterior by a posterior orifice. Eyes are distinct, and other cephalic organs, as ears, and a pineal eye may be inferred from impressions in the interior of the head-plates. Traquair regards late discoveries as showing some close relationship between ostracoderms and primitive sharks.

Four orders are recognized in the class. The oldest and simplest is the *Heterostraci*, represented by the family *Pteraspida*, whose species occur in various parts of the world in formations from the later Silurian and early Devonian Ages. The hard shield in these fishes, some of which were a foot in length, is formed of a few plates, well fused in the adult, each plate of which is unlike anything else in the *Chordata*, for it consists of three layers,—an inner or nacreous layer of lamellæ, a thicker middle layer of polygonal cancellæ, and an outer layer of dentine. Dermal sense-organs are well developed and arranged in canals within the middle layer, opening externally by a double series of pores. *Pteraspis* and *Cyathaspis* are well-known genera. Associated with this group by Traquair and Zittel-Eastman on later information, are the family *Calolepida*, formerly considered sharks; and the more familiar *Psammosteida*, which extend the range of the group into the Upper Devonian. A second order, *Anaspida*, consists of a few species ornamented outwardly with tubercles, but no armature of fused plates. The third order, *Aspidocephali*, or *Osteostraci*, consists of many forms found in the Upper Silurian and Lower Devonian, and especially in the Scotch Old Red Sandstone, which have a broad solid head-shield, consisting of three layers, the outer of hard vaso-dentine; the body of these fishes were covered with quadrangular scales; they had no paired appendages, but moved by means of a small dorsal fin and the heterocercal tail. This group is one of those most studied by Hugh Miller, Murchison, and other early geologists, and has been the object of special treatises by Huxley, Lankester, Brandt, etc. *Tremataspis* is a genus representing an allied family.

A fourth order, *Antiarcha*, contains that remarkable form *Pterichthys* and allied genera of the family *Asterolepida*. These were small fishes of robust form, the head and forward parts heavily armed with large tuberculated plates united into a solid buckler by lateral plates. The hinder part of the body, small fleshy dorsal fin, set near the tail and the heterocercal tail itself are covered with small scales, except in the finny portions. The most extraordinary feature in this curious primitive fish were the paddle-like appendages, closely resembling in shape and action the flippers of a marine turtle, which were articulated by a complex joint just behind and beneath the corners of the mouth and were completely armored. They formed swimming organs prefiguring the pectoral fins of later fishes. These and their allies, *Asterolepis*, *Bothriolepis*, etc., are found in the Devonian rocks of both Europe and North America. Consult: Woodward, 'Vertebrate Paleontology' (1898); Zittel-Eastman, 'Text-book of Paleontology,' Part II. (1902); Traquair, 'Fossil

Fishes . . . in the Silurian Rocks of the South of Scotland' (1899). See *ICHTHYOLOGY*.

**Ostrich**, a great African running-bird (*Struthio camelus*). The ostriches constitute a genus (*Struthio*) and a family (*Struthionidae*), of the group *Ratitæ* (q.v.), characterized by having but two toes, the third and fourth, of which the former is much the larger, and bears a short hoof-like nail; an almost equally unique internal feature is the symphysis of the pubic bones. The ostrich is by far the largest of existing birds, attaining a height of seven to eight feet and a weight of 300 pounds, and was exceeded by only a few more or less closely related extinct ones. There are no true down feathers, but the contour-feathers are soft and lax, with free barbs and no aftershaft, and are distributed uniformly over the skin without any arrangement into pterygæ and apteria. On the body the plumage is black or blackish, with the quill plumes of the wings and tail white; the head and neck are nearly, and the legs quite, naked. The head is remarkably small for a bird, the eyes large and the beak flat; the horny covering of the latter is peculiar in being composed of several pieces separated by soft skin, instead of being continuous as in most birds. The gape is straight and reaches to a point beneath the eye. The absence of functional wings and tail, the elevated back, the stout, column-like legs with padded toes, the long, erect, curved neck and the great size, all combine to produce a very unbird-like aspect, and to give a peculiar appropriateness to the name "camel-bird," applied to the ostrich by old writers.

Formerly the ostrich was abundant throughout Africa and a great part of the southern half of Asia. In the latter region it is now restricted to a few of the more inaccessible deserts, and in Africa is no longer found in the wild state, in Egypt or near the northern and southern settlements, but is still abundant throughout the intervening territory wherever sufficiently extensive and solitary wastes exist. Some zoologists consider that but a single species ranges over this whole vast territory; others have distinguished three: *Struthio camelus* of northern Africa, *S. australis* of southern Africa, and *S. molybdophanes* of Somaliland. In the first the naked parts of the skin are pink, in the second bluish, and in the last lead-colored; the eggs of the first have a surface of ivory-like smoothness, in the other two they are pitted. Wherever abundant, ostriches live on the plains in association with zebras, hartebeestes, gnus, etc. Like these animals they are extremely alert and wary as well as timid. So fleet are they that even the Arab on his blooded steed can seldom overtake one single-handed, and even when hunted in relays, as the birds circle about their favorite territory, one or more horses are frequently sacrificed to the chase. When in full flight a full-grown ostrich is said to cover 25 feet at a stride. They are also captured for the sake of their plumes by means of pitfalls, shooting with poisoned arrows, and in other ways. During the breeding season they form family parties consisting of one male and several females. The latter deposit their eggs to the total number of fifty or sixty in a shallow depression surrounded by a slight rampart of earth. Many of the eggs are broken, some of

## OSTRICH FERN — OSWALD

them to be devoured by the male, others to supply soft food to the young, so that the brood of young seldom exceeds twenty or thirty, many of which fall a prey to carnivorous animals. The male exclusively incubates at night, while during the day the females take turns in guarding the nest or incubating the eggs. During the breeding season the male protects his family faithfully and if driven to extremities fights viciously, kicking sideways or directly forward so powerfully that men and even horses are reported to have been killed by the blows. Although herbage is their chief food, everything edible is eaten, and their habit of swallowing every kind of hard object, just as other birds do gravel, to complete the grinding apparatus of the gizzard, has given to the digestive capacities of the ostrich a wholly undeserved notoriety. They are very fond of water and bathe when opportunities offer.

*Domestication of the Ostrich.*—Although the flesh is but little used, the eggs of the ostrich are much esteemed for food by native Africans, and their shells serve a useful purpose in the construction of vessels and implements. But it is their plumes which have given a mercantile value to ostriches from ancient times till now. To furnish a ready supply as the wild birds became scarcer in accessible regions, domestication has been resorted to. This is said to have been practised by native tribes for many years, and about the middle of the last century was begun by the French in Algiers and the English in Cape Colony. In the latter place there are said to be now upward of 300,000 domesticated ostriches, yielding an annual revenue of \$5,000,000. Ostrich farming in the United States is still in its infancy, but promises to become an important industry. The first experimental importation of ostriches was made into California in 1882, and at the present time about 1,500 of these birds are to be found on the pioneer ostrich ranches of California, Arizona, Texas, and Florida. Large, level, grassy fields are enclosed by strong high fences, to form corrals in which the general flock runs. The breeding birds are separated in pairs or sets of one cock and two hens in smaller pens. A single pair will sometimes produce as many as 35 young, the average loss of which is as low as 10 per cent in California, but much higher in Arizona. By the removal of the eggs as soon as laid and rearing them in incubators the output is much increased. In Africa a single trio of birds has been known to produce 188 eggs, from which 133 young were raised in a single year. The chief sources of loss are injuries by the parent birds, cold, dry food, and in Africa an infectious disease. The newly hatched young are the size of a full-grown barnyard hen, and when well fed increase in height so rapidly that by the end of six months they nearly equal their parents. At first they are sheltered at night in brooding boxes, but are turned loose during the day to feed on green alfalfa or other succulent plants, which are, with an abundance of water, their nearly exclusive diet. Dry food is very likely to cause fatal digestive disturbances in the young. The old birds require but little care and are fed on any vegetable matter, but principally upon chopped beets, cabbage, oranges, and corn. The plumes from the wings and tails

of the fully grown birds are the most valuable, and are cut or plucked once or twice a year, each bird yielding about \$50 worth annually on the American ranches, but very much more than that on the African farms. When the American stock has become thoroughly acclimated this industry will probably yield rich returns, as some of the South African farms are reputed to pay 40 per cent net profit on the investment. Experiments in ostrich breeding are being tried in Mexico, Central and South America.

Consult: Mosenthal and Harting, 'Ostriches and Ostrich Farming' (1877); Martin, 'Home Life on an Ostrich Farm' (1891); Duncan, Report United States Department of Agriculture for 1888.

**Ostrich Fern**, a genus (*Matteuccia*) of ferns of the natural order *Polypodiaceae*. The best known species (*M. Struthiopteris*), a native of Europe and eastern North America, has fertile fronds which resemble ostrich plumes; its sterile ones, which often attain a height of ten feet, form a handsome vase-like mass of foliage. It may be readily propagated from offsets and is one of the most easily cultivated native ferns. See also FERNS AND FERN-ALLIES.

**Ostrogoths**, ōs'trō-gōths, a people of the Gothic race who lived at a very early time in southern Russia. They were conquered by the Huns 375 A.D. In 479 they crossed the Alps into Italy and became incorporated with other nations.

**Osuna**, ō-soo'nā, **Pedro Tellez y Giron**, DUKE OF, Spanish soldier: b. Valladolid 1579; d. castle of Alameda 1624. His caustic and satiric wit twice forced him to leave the Spanish court, to which he returned through the favor of the Duke of Lerma, after distinguishing himself in the Netherlands. He opposed the expulsion of the Moors, thus bringing upon himself the charge of religious infidelity. In Sicily, where he was viceroy 1611-15, and in Naples, where he held the same position 1616-20, he did much for the improvement of the common people, but was an enemy of the clergy in general and of the Inquisition in particular. He probably aimed to build up an Italian kingdom for himself, and in 1620 was recalled, arrested, subjected to a three years' secret trial, and imprisoned in the castle of Alameda, where he poisoned himself.

**Oswald**, ōz'wāld, **Saint**, king of Bernicia, in Northumbria, England, from 634 to his death 5 Aug. 642. His father Ethelfrith had been one of the most powerful of the Saxon monarchs, but on his death the kingdom was overrun with invaders and Oswald his son was banished among the Scots in Ireland. Here he became converted to Christianity which he resolved should be the religion of his kingdom. In 636 he recovered the throne of Northumbria and requested the monks of Iona to send missionaries for the conversion of his pagan subjects. In response Aidan (q.v.) came with a band of clergymen and established himself as bishop in the island of Lindisfarne. In a few years the whole north of England was converted to the faith. Meanwhile Penda, king of Mercia, was persecuting the Christians, and at length declared war on Northumberland. A battle took place at Maserfelth, and Oswald was slain. Sub-

## OSWALD — OSWEGO BASS

sequently the place was called Oswestry or Oswald's Cross, after this zealous and pious monarch, who, before the two armies joined battle, had set up a cross on the ground between them. His monument is still to be seen in Gloucester Cathedral where his relics had been deposited, and he was canonized as a king and martyr, his festival being celebrated 5 August. Consult Churton, 'History of the Early English Church.'

**Oswald, Eleazer**, American soldier and journalist: b. in England 1755; d. New York 30 Sept. 1795. He came to America in 1770 through sympathy with the patriot cause. In 1775, under Benedict Arnold, whose secretary he became, he served as captain at Ticonderoga and also at Quebec, where, Arnold being wounded, Oswald took command with great efficiency. In 1777 he rose to the rank of lieutenant-colonel. He engaged in the business of printing and publishing in Philadelphia and in New York, and politically was in violent opposition to Hamilton and the Federalists. He entered the French army, in which, at the battle of Jemappes, he commanded an artillery regiment. The French government sent him on a mission to Ireland, after performing which he returned to New York.

**Oswald, Felix Leopold**, American naturalist: b. Namur, Belgium, 6 Dec. 1845; d. 27 Sept. 1906. He was graduated from the University of Brussels in 1865 and studied later at Göttingen and Heidelberg. He became a physician; later abandoned the practice, came to the United States and devoted himself to natural history. He published 'Summer-Land Sketches' (1880); 'Physical Education' (1882); 'The Secret of the East; or, The Origin of the Christian Religion' (1883); 'Days and Nights in the Tropics' (1887); 'The Bible of Nature'; 'Body and Mind'; 'Zoological Sketches'; etc.

**Oswegatchie**, ōs-wē-gāch'ī, **Fort**, a former French fortification near Ogdensburg, N. Y. It was also called Fort Preservation, and Fort La Gallette. In 1760 it was taken by the British and called Fort William Augustus.

**Oswego**, ōs-wē-gō, Kan., city, county-seat of Labette County; on the Neosho River, and the Missouri, Kansas & T. and the Saint Louis & S. F. R.R.'s; 132 miles south-southeast of Topeka. The river furnishes excellent water-power, and there are a number of mills, including flour-mills. It is also the centre of a grain and live-stock region; and there is some coal in the vicinity. A public library is maintained by the Library Association. Pop. (1890) 2,574; (1900) 2,208; (1910) 2,317.

**Oswego**, N. Y., city, port of entry, county-seat of Oswego County; on Lake Ontario at the mouth of the Oswego River, and at the northern terminus of the Oswego Canal. It is on the Delaware, Lackawanna & W., the New York, Ontario & W., and the New York Central & H. R. R.R.'s; about 35 miles north by west of Syracuse. Oswego was founded, in 1724, as a trading post and military station. It was incorporated as a village in 1828, and in 1848 was chartered as a city. It was one of the most important places on Lake Ontario and in wars which took place along the northern frontier it was always considered a vantage ground and its possession was contested. In the French and Indian war and King George's war, Colonel

Mercer built here two forts, strong for the times, 1755. In August 1756, the place was captured by General Montcalm, who destroyed the forts. This capture of Oswego was considered one of the important events of the French and Indian war. About 30 men on each side were killed or wounded and 1,690 of the British were taken prisoners. Oswego was made the centre of the military operations along the lake and, in the year 1759, General Amherst started from this place, with a force of 10,000 men, for Quebec where Wolfe was in command. Oswego was the meeting place, in 1766, between Sir William Johnson and Pontiac, and at this meeting the latter submitted to the British. In the War of 1812 this place was again a disputed point. Its good harbor was always an attraction. On 6 May 1814 a British force attacked the place and captured it. After peace was restored, the place prospered and grew steadily as an important lake port and a shipping point for the products of the rich farms of the vicinity. When the West began to develop as a wheat country, and the grain was at first sent East to be manufactured into flour, Oswego was one of the chief points of manufacture and re-shipment. The grain elevators and flour mills were then prominent features along the river and canal. The opening of the flour-milling industry in the West, near the wheat-fields, deprived the city of its great industry, from which loss it did not recover for years. The excellent water-power was finally used for manufacturing other products, and the city has now (1904) a large starch factory, machine-shops for oil-well supplies, boiler and engine works, knitting mills, car spring works, match and cigar factories, shade cloth mills, and breweries. The lake trade has increased and the city exports manufactured goods, farm products and fruit. The harbor, with its outer and inner haven, which can accommodate large steamers, has been so improved that the quantities of coal, lumber, and grain brought here for re-shipment can be handled with great rapidity. The exports in 1903 were nearly \$3,000,000 and the imports, nearly \$700,000. The beautiful parks, the drives, especially near the lake and along the river, fine residences, and grounds, all make an attractive city. Some of the places of interest are the old Fort Oswego (q.v.), the present Fort Ontario which overlooks the harbor, the government building, the State Arsenal, the court-house, and city-hall. Oswego is noted for its State Normal and Training School, founded by Edward Austen Sheldon (q.v.). It has fine public and parish schools and the Gerrit Smith Library. The government is administered under a charter of 1896 which provides for a mayor, who holds office two years, and a council. The waterworks are owned and operated by the municipality. Pop. (1890) 21,842; (1900) 22,199; (1910) 23,368.

**Oswego**, a river in New York, formed by the junction of the Oneida and Seneca rivers in the northern part of Onondaga County, and flowing north by west enters Lake Ontario at Oswego. It is 24 miles long and has a fall of 120 feet from its source to the lake. By means of a canal and locks, the river has been made navigable some distance from its mouth.

**Oswego Bass**, the large-mouthed black bass. See Bass.

## OSWEGO — OTHMAN

**Oswego, Fort**, the name of the fort built by the French on the site of what is now the city of Oswego. Later Fort Ontario was built on the opposite side of the Oswego River. See OSWEGO.

**Oswego Tea**, a name given to several species of labiate plants of the mint-like genus *Monarda*, particularly *M. purpurea*, *M. didyma*, and *M. kalmiana*, natives of North America, because of the occasional use of an infusion of the dried leaves as a beverage. The infusion is said to be useful in intermittents and as a stomachic. Some other species of *Monarda* are used in the same way, and are not uncommonly cultivated in gardens for ornament, where they are sought by bees.

**Osymandyas**, ōs-ī-măn'dī-as, Egyptian king, said by Greek writers to have reigned during the period between Menes and Moeris, and to have invaded Asia with a great army, penetrating as far as Bactriana. According to Diodorus, on his return he erected great works at Thebes, among which was a monument of unequalled magnificence, the Osymandeion, but this is supposed to be identical with the Ramesseum on the west bank of the Nile at Thebes, built by Rameses II., with whom, however, there is much difficulty in identifying Osymandyas himself, whose exploits appear to be mostly of a fabulous character. Consult: Diodorus, i. 47-9; Tzetzes, 'Chiliades' iii. 892; iv. 620; Budge, 'A History of Egypt' (1902).

**Otago**, ō-tā'gō, New Zealand, a southern provincial district of South Island, bounded west, south and east by the Pacific, and on the north by Canterbury and Westland. Area 25,487 square miles. The capital is Dunedin, other towns are Port Chalmers, Oamaru, Invercagill, etc. Otago was settled in 1848 by a body of Scotch Free Churchmen. Pop. (1901) 173,145. See NEW ZEALAND.

**Otaheite**, ō-tā-hē'tē or ō-tā'hē-tē, an island in the Pacific Ocean, now known as Tahiti. See TAHITI.

**Otal'gia**, earache; specifically neuralgia of the ear. Its attack is usually sudden, the pain coming on at once with full intensity. It is often associated with other ailments, of which it may be only a local symptom, and frequently arises from disorders of the teeth. Neuralgic pains in other parts of the face often follow it. When otalgia is very intense it extends to the temple and nerves on the same side of the face, in which it causes acute pains. It frequently departs suddenly, and returns again generally to the same ear. The treatment when the disease is symptomatic must depend upon the cause. Ordinarily earache is due, not to otalgia, but to otitis media (q.v.), or inflammation of the middle or tympanic portion of the ear.

**Otaru**, ō-tā-roo, Japan, the chief town on the west coast of Hokkaido on the south shore of Ishikari Bay, and connected by rail with Sapporo and the coal region of Ishikari. It has important herring and other fisheries and a large trade. Interesting archæological remains have been found in the vicinity.

**Otavallo**, ōt-ā-vā'lō, Ecuador, town, province of Imbabura; 25 miles northeast of Quito. It was settled in 1534; in 1868 it was completely destroyed by an earthquake and many of the

inhabitants were killed. Since then it has been well rebuilt, and has several mills manufacturing cotton and woolen goods. Pop. about 6,000.

**Otchakoff**, ō-chă'kōf, Russia. See ОЧАКОВ.

**O'tero, Miguel Antonio**, American capitalist and politician: b. Saint Louis 17 Oct. 1859. He was educated at Saint Louis University and at Notre Dame University, Ind. From 1880-5 he was cashier of the San Miguel Bank of Las Vegas, N. Mex., and is director and official in several important companies. He has been clerk of San Miguel County, city treasurer of Las Vegas, and clerk of the United States district court for the 4th judicial district of New Mexico. In 1892 he was a delegate to the Republican National Convention; and in 1900 chairman of the Territory's delegation to the Convention. He was appointed governor of New Mexico in 1897, and re-appointed in 1901 for a term of three years.

**Otero, Rafael**, Cuban dramatist: b. Havana 1827; d. there 1876. His first comedy was performed so early as 1842. Several others were afterward presented at Matanzas and Havana, among them: 'El Coburgo,' 'Del Agua Mansa,' 'Mi Hijo el Francés,' and 'Un Novia del Día.' He further wrote two works of fiction, 'La Perla de la Diaria' (1866) and 'Cantos Sociales' (1868). Much of what he wrote remains in the files of periodicals.

**Otfried**, ōt'frēd, Alsatian theologian and poet: b. about 800; d. about 875. He was the author of one of the earliest specimens of composition in the German language. After having become a monk of the Abbey of Weissenburg, in Alsace, he studied under Rabanus Maurus, abbot of Fulda. He then returned to his monastery, where he opened a school of literature, and wrote a variety of works in prose and verse. The most important of these is a rhymed version or paraphrase of the Gospels in Old High German, still extant, in which there are some passages of lyrical poetry. He completed it about 868, and dedicated it to Ludwig, king of Germany. An edition of it was published by Piper in 1808, and modern German translations by Rapp (1858) and Kelle (1870).

**Othello**, ō-thēl'ō, **The Moor of Venice**, **The Tragedy of**, a drama by Shakespeare which ranks with 'Hamlet,' 'Lear,' and 'Macbeth,' as one of the poet's four great masterpieces of tragedy. It was acted in 1604, printed in 1622 in a quarto edition, and was included in the First Folio of 1623. The source of the tragedy is the story entitled 'Un Capitano Moro' in Cinthio's 'Hecatommithi,' a collection of tales and novels printed in Italian in 1555. The 'Hecatommithi' appeared in French in 1684, but Shakespeare has followed the Italian version in its general outlines.

**Othman**, ōth-măn', or **Osman I.**, surnamed GHAZI, "the Victorious," Turkish sultan, founder of the Ottoman or Osmanli empire, which was named after him: b. Sukut, Bithynia, 1259; d. 1326. In 1288 he succeeded his father Ertoghul as chief of a Turkish horde in Phrygia, and in 1299, after successful campaigns which put the eastern part of Asia Minor in his hands, proclaimed his independence and took the title of sultan. Nicæa (1304), Marmora (1307) and Broussa (1326) came under his sway, and in his last years he made Karahissar his capital and

## OTHMAN — OTHO

issued a regular coinage. He was succeeded by his son Orkhan.

**Othman**, or **Osman II.**, sultan of the Turks: b. 4 Nov. 1605; d. Constantinople 20 May 1622. The son of Ahmed I., in 1618 he came to the throne as 16th sultan and successor of his deposed uncle Mustapha I. He was defeated at Choczim (1621) by Sigismund III., king of Poland; attempted to suppress the Janizaries; but was captured by them and imprisoned. He was killed in prison by the grand vizier.

**Othman Ibn Affan**, third Moslem caliph: b. Mecca about 565; d. Medina 656. Mohammed's secretary and lieutenant, he married the Prophet's two daughters, and in 644 after the death of Omar was chosen caliph by the six appointed by Omar, of whom one actually wished Othman's election, each of the others pressing his own claims. Othman was then old and feeble, and not by nature over energetic in his prime, but he seems to have carried things with a high hand. He occupied Persia (645-7), eastern Africa, and Nubia (651), began the spread of Islam in the islands of the Mediterranean, dared remove from their offices the tried generals of Abu Bekr and Omar to make room for his kinsmen and favorites, and raised a storm of disapproval by sitting in the very seat of Mohammed instead of two steps below it, like his two predecessors. He attempted to introduce a definitive revision of the Koran. A great plot, embracing all his early rivals and the sectaries who differed with him, was formed; the Caliph was besieged, having broken his promise to appoint new governors, and was assassinated. His rule, though disturbed at home, was the beginning of the imperial growth of Islam, thanks to the conquest of Cyprus, Armenia, North Africa, etc.

**Otho I.**, *ō'thō* (THE GREAT), emperor of Germany: b. 23 Nov. 912; d. 7 May 973. He was son of Henry I., and was crowned king of Germany at Aix-la-Chapelle in 936. His reign of 36 years was an almost uninterrupted succession of wars. After a 14 years' struggle he subdued Boleslav, duke of Bohemia; wrested the duchies of Swabia, Bavaria, and Lorraine from the Dukes of Bavaria and Franconia, and gave them (in 949) to his sons Ludolf and Henry, and to his son-in-law Conrad, count of Worms, respectively. He delivered the Italians from the oppressions of Berengar II., married the widow of Lothar, their first king, and was crowned king of Lombardy (951). In 961 he was crowned king of Italy, and in the next year emperor by Pope John XII. But shortly after John made an alliance with Adalbert, king of Upper Italy, to drive the Germans out. Otho, the following summer marched against Rome, drove John out, deposed him and placed Leo VIII. in the papal chair, though this proceeding is recognized as uncanonical and Leo is reckoned an anti-pope. The Byzantine court refused to acknowledge Otho's claim to the imperial dignity; but he defeated the Greek forces in Lower Italy, and the eastern emperor, John Zimisces, gave the Greek princess Theophania to Otho's son Otho in marriage. He was at once the greatest political and military power of the West.

**Otho II.**, called *DER ROTE* ("The Red"), emperor of Germany: b. Rome 955; d. there

7 Dec. 983. He was the youngest son of Otho I. His elder brothers had all died before their father, who caused him to be crowned king of Rome (967), the first instance of the kind in German history. He assumed power in 973, and subdued the revolt of several powerful vassals, including his cousin, Henry II., duke of Bavaria. In Italy he suppressed a rising under Crescentius, and then attempted to drive the Greeks from Lower Italy; but they called in the aid of the Saracens from Sicily, and Otho suffered a total defeat near Cotrone, Calabria, 13 July 982. He died before fresh plans of conquest against Greeks and Arabians could be executed.

**Otho III.**, called *MIRABILIA MUNDI* ("Wonder of the World"), emperor of Germany: b. July 980; d. 23 Jan. 1002. He was son of Otho II., and the last of the male branch of the Saxon imperial house. He was only three years old when he succeeded his father. In 996 he marched into Italy and crushed a fresh insurrection fomented by Crescentius. He was crowned emperor in 996 by Gregory V. He again crossed the Alps in 998 to suppress a second rebellion under Crescentius, whom he caused to be beheaded. On the death of Gregory, Otho raised his old tutor, Gerbert, to the pontificate as Sylvester II. Peace in Rome was, however, only temporary, and until his death Otho was mostly employed in quelling disturbances in various parts of Italy. Some historians assert that his death was due to poisoning, an act of revenge on the part of the widow of Crescentius. The emperor was a strict religious, much given to penances and pilgrimages.

**Otho IV.**, emperor of Germany: b. 1182; d. 19 May 1218. He was the son of Henry, Duke of Saxony. He was chosen by the Guelphs as rival king to Philip of Swabia in 1198, was recognized as sole king in 1208, and was crowned emperor at Rome 4 Oct. 1209. However, the emphasis which he placed upon imperial sovereignty in Italy displeased the Pope, who excommunicated him in 1210, and in 1212 declared Frederick II. the true king of Germany. He finally relinquished the struggle against Frederick and retired to his possessions in Brunswick.

**Otho**, or **Otto, I.**, king of Greece, second son of King Louis of Bavaria: b. Salzburg 1 June 1815; d. Bamberg 26 July 1867. He was educated at the University of Munich, was nominated king of Greece by the London Conference 7 May 1832, and chosen to this office by the Greek National Assembly 8 August. Until 1 June 1835 he was guided by a regency. Upon coming to his majority he showed himself too weak, too easily influenced by his Bavarian courtiers, and, above all, too much under Russian control to win the confidence of the people. Internal discord, financial difficulties, and open breaks with Great Britain and France followed, and 24 Oct. 1862 he was deposed by a provisional government, and returned to Bamberg. The only work of any importance that he accomplished for Greece was the organization of a system of education; a stronger man in his place would probably have profited by the repeated opportunities given Greece to acquire some territory of Turkey.

**Otho, Marcus Salvius**, Roman emperor: b. 32 A.D.; d. 69 A.D. He was for a time governor

## OTIS

of the province of Lusitania (Portugal) and joined Galba when the latter rebelled against Nero. On Galba's accession in 67 Otho became the royal favorite and was made consul; but when Galba appointed Piso as his successor, Otho, securing the allegiance of the pretorian guard, had Galba and Piso murdered, and was proclaimed emperor in 69. The eastern provinces acknowledged him as emperor, but in Germany Vitellius was proclaimed by the legions of the lower Rhine. Having led his army into Italy Vitellius overthrew, at Bedriacum, the forces of Otho, who killed himself after reigning three months and a few days.

**O'tis, Bass**, American artist: b. New England 1784; d. 1861. He first came into public notice as a portrait painter in New York, and nothing is known about his previous years of study. In 1812 he settled in Philadelphia where his only known genre picture, 'Interior of a Forge,' hangs in the Pennsylvania Academy of Fine Arts. His portraits include those of President Jefferson; Alexander Lawson; the painter Jarvis; and Dr. Physick. He has left a portrait of himself. Some of his works he reproduced in mezzotint.

**Otis, Elisha Graves**, American inventor: b. Halifax, Vt., 3 Aug. 1811; d. Yonkers, N. Y., 8 April 1861. He worked on a farm; was a carriage maker 1838-45; and was head of manufacturing concerns in Albany, Bergen Heights, N. J., and Yonkers. His great invention, that of a safety device for an elevator so that it can not fall even if the cable on which it is hung should break, was perfected for use in the last-named factory, and probably did more to increase the value of city real estate by making tall buildings possible than any other invention of the century. Otis also invented a special and independent engine for elevators, as well as a staple machine, a steam plow, a rotary oven, and a safety bridge, which although without a draw does not impede navigation. The great elevator business begun by him is carried on by his sons Charles Rollin and Norton Prentiss Otis.

**Otis, Elwell Stephen**, American soldier: b. Frederick, Md., 25 March 1838; d. 21 Oct. 1909. He was graduated at Rochester University in 1858, and at Harvard Law School in 1861; entered the Union Army in 1862 as captain of the 140th N. Y. Infantry, and took part in many battles. Disabled for duty by a wound at Petersburg 1 Oct. 1864, he was discharged from the volunteer service with brevet rank of brigadier in 1865; in 1866 became lieutenant-colonel of the 22d Infantry; served in the West 1867-85, being organizer and head of the Leavenworth School of Infantry and Cavalry from 1881 to 1885. He commanded at Assiniboine, Mont., 1885-90; from 1890 to 1893 was superintendent of the recruiting service, his rank in the latter year being full brigadier; and, after commanding the Department of the Columbia 1894-7 and the Department of the Pacific 1897-8, was appointed commander of the United States forces in the Philippines and military governor. He was a member of the Philippine Commission 1899. In May 1900 he retired from the governorship of the Philippines; in June was promoted major-general; and in October became commander of the Department of the Lakes; a

post which he held until his retirement from active service in March 1902.

**Otis, Fessenden Nott**, American surgeon: b. Ballston Spa, N. Y., 6 May 1825; d. 24 May 1900. He was graduated from the New York Medical College in 1852; was surgeon of the New York police department in 1861; lecturer on genito-urinary diseases at the New York College of Physicians and Surgeons 1862-71, and clinical professor there from the date last named. Among surgical instruments invented by him may be cited the urethrometer; and the dilating catheter. He published 'History of the Panama Railroad and the Pacific Mail Steamship Company' (1849); 'Urethral Strictures' (1877); 'Genito-Urinary Diseases' (1883).

**Otis, Harrison Gray**, American orator and statesman, nephew of James Otis (q.v.): b. Boston, Mass., 8 Oct. 1765; d. there 28 Oct. 1848. He was graduated from Harvard in 1783, studied law and was admitted to the bar in 1786. He was a member of Congress, 1797-1801, and United States Senator, 1817-22. He had previously sat in the Massachusetts Legislature; and he took an active part in the Hartford Convention of 1814; and was mayor of Boston in 1829. His published works include: 'Letters in Defense of the Hartford Convention' (1824), and 'Orations and Addresses.'

**Otis, James**, American Revolutionary statesman: b. West Barnstable, Mass., 5 Feb. 1725; d. Andover, Mass., 23 May 1783. He was graduated from Harvard in 1743, studied law in the office of Jeremiah Gridley at Boston, was admitted to the bar at Plymouth, but after two years of practice there settled in 1748 in Boston, where he quickly attained eminence in the courts. During his rise in the law, he found an avocation in the study of the classical and English literatures, and published 'The Rudiments of Latin Prosody' (1760), a work of careful scholarship. He was appointed attorney-general, but this post he resigned rather than support the writs of assistance, application for which had been made in the Massachusetts supreme court. These writs were warrants permitting general search for smuggled goods, and Otis was entirely convinced of their illegality. In February 1761 the matter came to debate before the court. Gridley appeared for the crown and Otis and Oxenbridge Thacher, another well-known lawyer, for the opposition. Otis' speech, occupying some four or five hours and marked by an argument of great learning and intellectual force, has been called the prologue of the Revolution. John Adams, whose notes taken in the court-room and later revised are the only authority for the content of this great effort, declares that "then and there was the first scene of the first act of opposition to the arbitrary claims of Great Britain." Decision was reserved; and though some writs were granted, none was ever enforced. In 1761 Otis was elected to the legislature, where he gained a high reputation for his eloquence and patriotic earnestness. From this time until 1769 he was the pre-eminent leader of thought in that discussion and development of opinion which preceded the war. In 1762 he published 'A Vindication of the Conduct of the House of Representatives of the Province of Massachusetts Bay,' a brochure of "exasperating candor," of which



John Adams said, 'How many volumes are concentrated in this little fugitive pamphlet . . . !' This is regarded as a chief source for subsequent arguments against Parliamentary taxation and in favor of free speech. It was followed by two others, 'The Rights of the British Colonies Asserted and Proved' (1764), which maintained a conciliatory tone and was therefore displeasing to the extremists, and 'Considerations on Behalf of the Colonies' (1765), increasingly bitter, and satisfactory to his previous critics. Otis was a prominent member of the Stamp Act congress, which met at New York in October 1765; in 1766 was elected speaker of the general court, but did not assume office because of the negative of the governor. In 1768, after Townshend's bill for the taxation of the colonies had been passed by Parliament, the general court despatched to the remaining colonies a second circular-letter, urging unity in some plan toward common protection. This letter was drafted by Otis and corrected by Samuel Adams. Bernard, royal governor, demanded the recall of the letter as traitorous, and Otis made a speech, advocating non-compliance, which the royalists thought might be the 'most violent, insolent, abusive, and treasonable declaration' ever uttered. But the legislature did not vote for the recall of the circular. Otis was now wholly occupied with public interests, writing for the press and addressing political gatherings. In 1769 he was accused in England of treason by the customs commissioners, and replied by a denunciation of the commissioners of the Boston 'Gazette.' He thus became involved in a quarrel with Robinson, one of the commissioners, during which he received a wound of the head which is supposed to have brought about his subsequent insanity. He was awarded £2,000 damages, but refused to claim the sum upon receipt of a written apology. During the rest of his life he was subject to fits of aberration, and though he was in the legislature in 1771 and for a brief time resumed his Boston practice, he continued in general unequal to public and professional duties. While in an unbalanced condition he took part in the battle of Bunker Hill. He was killed by a flash of lightning. More than any other American Otis gave the impetus and direction to the struggle for independence. Consult the biographies by Knapp in 'Sketches of Eminent Lawyers, Statesmen, and Men of Letters' (1821) and Tudor (1823); also Tyler, 'Literary History of the American Revolution' (1897).

**Otis, James.** See KALER, JAMES OTIS.

**Otoc'yon.** See CAPE FOX.

**O'tolith.** See ANATOMY; EAR.

**Otsego,** ô-t-sê-gô, a lake in Otsego County, N. Y., the main source of the Susquehanna River. It is a beautiful body of water; along its shores are many attractive cottages, but it is noted chiefly for its connection with James Fenimore Cooper (q.v.). Cooperstown (q.v.) is on the south shore.

**Otsego Bass.** See WHITEFISH.

**O'tar of Roses.** See ATTAR OF ROSES.

**Ottawa,** ô't'a-wa, Canada, city, capital of the Dominion of Canada, and of Carleton County, in the Province of Ontario; at the confluence of the Ottawa and Rideau rivers, and on

the Canadian Pacific, Canada Atlantic (Grand Trunk), and New York and Ottawa (New York Central), railroads; about 120 miles west of Montreal. The Chaudiere Falls, in the Ottawa River, are 600 feet wide and 40 feet high. A road bridge spans the river immediately below the falls, while the C. P. R. Ry. bridge crosses some distance above, and a large combined railway and road bridge an equal distance below. The Rideau Falls, so called by the early French explorers because of its curtain-like appearance, carry the waters of the Rideau River into the Ottawa, toward the eastern end of the city. These falls, as well as the Chaudiere, supply extensive water-power. A careful estimate places the available water-power in the immediate neighborhood of Ottawa at 200,000 horse-power, while within a radius of 45 miles there is a total of 1,000,000 horse-power. Ten bridges cross the Rideau River within the city limits. The Ottawa River, and its tributary the Gatineau, are the routes by which timber is brought down to Ottawa from the great northern limits.

**Industries, etc.**—Around the Chaudiere are a number of large industries, for the most part connected with the cutting and manufacture of lumber. The cut of timber in the Ottawa Valley has been nearly 700,000,000 cubic feet in one year, and almost every foot was prepared for market in the Ottawa and Hull lumber mills. Besides the lumber industry proper, there are large mills and factories, both on the Ottawa side and in the neighboring city of Hull, for the manufacture of matches (with a daily output of 35,000,000 matches), indurated fibre ware, wooden ware, pulp, and paper, as well as flour mills, tanneries, brick and tile works, foundries, machine-shops, railroad car and repair shops, furniture factories, carriage works. The taxable assessment of Ottawa exceeds \$30,000,000, and there is \$17,000,000 of property exempt from taxation, of which \$11,000,000 belongs to the federal government, and the remainder religious, charitable, educational, and municipal institutions. Ottawa is the centre of a good farming district, and within a few miles of the city, on the Quebec side of the river, are extensive mineral deposits, iron, asbestos, phosphate of lime, mica, zinc, plumbago. Electric railways cover every section of the city, and extend out of town east to Rockliffe Park, and west to Britannia-on-the-Bay, on the south side of the Ottawa, and Victoria Park, on the north or Quebec side.

**Principal Buildings.**—The Parliament and Government buildings, situated on Parliament Hill, 125 feet above the river, and covering about four acres of land, are built in the Italian Gothic style, of Canadian sandstone quarried in the Ottawa Valley, and Devonian sandstone from Potsdam, N. Y. The foundation-stone was laid by the Prince of Wales (now King Edward VII.) in 1860. The original buildings, including the Victoria Tower, 180 feet high, and the library, cost about \$8,000,000. The growth of the country in recent years has necessitated the building of a fourth large building, known as the Langevin Block, facing the Houses of Parliament, but outside the grounds, and since its completion, government business has increased so rapidly that half a dozen large buildings have had to be leased for departmental use, in various parts of the city. Other

## OTTAWA

prominent buildings are Rideau Hall, the official residence of the Governor-General, the post-office, city hall, public library, banks, churches, colleges and schools. A large building, to cost in the neighborhood of \$1,000,000, is now under construction, to accommodate the Geological Museum and National Art Gallery. Special buildings are also being put up for the Royal Mint, the Astronomical Observatory and the National Archives.

*Churches, Educational Institutions, Libraries, etc.* — There are two cathedrals, Church of England and Roman Catholic, as well as six hospitals, orphanages, and homes for the aged and the friendless. Under the school laws of the Province separate systems of schools are maintained for Protestants and Roman Catholics. The chief educational institutions are the University of Ottawa (R. C.), the Provincial Normal School, affiliated with Toronto University, the Model School, Collegiate Institute, Ladies' College, Saint Joseph's College, and a number of special schools in charge of the Oblate Fathers, three theological schools, a number of private academies, and the public and separate schools. There are several libraries, chief of which is the Library of Parliament, which contains (1904) about 200,000 volumes, besides some valuable manuscripts. Next to Toronto, Ottawa is the chief intellectual centre of the Dominion.

*Societies, etc.* — Ottawa is the headquarters of the Royal Society of Canada, as well as of the Literary and Scientific Society, the Field Naturalists Club, the Women's Historical Society, the Aberdeen Association, and other organizations of a like nature. Representatives from a number of foreign countries, including a United States consul-general, are stationed at Ottawa. The Pope is represented here by a special envoy.

*Banks.* — The head office of the Bank of Ottawa is here, and most of the other large chartered banks of the country have branches. There is also a Post-Office savings bank.

*History, Government, etc.* — Champlain gives us the first account of what is now the site of Ottawa, but it was not until the end of the 18th century that the first white settler, one Philemon Wright, a New Englander, cut a home for himself out of the woods on the Hull side of the river. Wright acquired property on the south side as well, and transferred the site of the future capital to one Nicholas Sparks as payment for farm labor. Sparks reluctantly accepted the land. His descendants are now among the best-known and wealthiest families of Ottawa. In 1826 the British Government sent out Colonel By to survey and construct the Rideau Canal, to connect the Ottawa with the St. Lawrence at Kingston. The engineers and laborers engaged upon the canal formed the nucleus of the future city, which was at first called Bytown. Sir John Franklin, returning home from one of his Arctic voyages, laid the corner-stone of the canal locks in 1827. In 1854 Bytown was incorporated as a city and the name changed to Ottawa. In 1858 Queen Victoria selected it as the capital of Canada, much to the disgust of the rival cities of Montreal, Quebec, and Toronto. The first Dominion Parliament was held here in

1868. The government maintains a large experimental farm a mile or two south-west of the city. Hull (q. v.), across the river and in the Province of Quebec, is one with Ottawa in commercial and industrial matters, but entirely separate in municipal government. The government of both cities is vested in a mayor and corporation. Pop. (1900) 58,193; (1904) 63,000.

LAWRENCE J. BURPEE.

*Ottawa, Ill.*, city, county-seat of La Salle County; at the confluence of the Fox and Illinois rivers, on the Illinois & Michigan Canal, and the Chicago, B & Q. and the Chicago, R. I. & P. R.R.'s; about 80 miles southwest of Chicago. It was settled as farm land in the early part of the 19th century, but was not incorporated until 1837. It is in a productive agricultural region, in which are extensive deposits of fire-clay, glass-sand, and bituminous coal. It has considerable manufacturing interests, the chief establishments are glass factories, potteries, agricultural implement shops, saddleries, carriage factories, and organ and piano factories. It has a large trade in brick, tile, sewer pipe, and other manufactures, and in farm and dairy products. Some of the prominent buildings are the Illinois Appellate Court building, the city and county buildings, the Ryburn Memorial Hospital, and the church and school buildings. Its educational institutions are Pleasant View College, under the auspices of the Lutherans, Saint Francis Xavier Academy (R. C.), public and parish schools, a high school library, and Odd Fellows' and Reddick's public libraries. It has four beautiful parks. The city charter, in accordance with the State law of 1871, provided for a mayor, who holds office two years, and a council; but now the government of the city is on the commission plan. The city owns the electric-light plant and owns and operates the waterworks. Pop. (1910) 9,535.

*Ottawa, Kan.*, city, county-seat of Franklin County; on Marais des Cygnes River; and on the Missouri Pacific, the Atchison, T. & S. F., and the Southern Kansas R.R.'s; about 40 miles southeast of Topeka. It is in a farming and dairy section. The place was named for the Ottawa Indians who emigrated from Ohio in 1833. The town was founded by John Tecumseh Jones, a Pottawatomie missionary, who taught the Ottawas. The Santa Fé Railroad shops, employing 400 men, are located here. It has flour mills, carriage works, creameries, grain elevators, and furniture factory. There is considerable trade in live-stock, dairy products, nursery stock, grain, wool, and fruit. It is an attractive, residential city, with well-kept streets and fine parks. It is noted for its moral tone and as being an educational centre. It is the seat of Ottawa University, a Baptist institution which had, in 1903, 700 students. It has the summer educational and social gathering called the Ottawa Chautauqua Assembly, the second (in point of time) "Chautauqua" in the United States. It has also a free public library. There are 22 church edifices, and the place is often called "The City of Churches." Since the State "Prohibitory Law" went into effect, Ottawa has never tolerated the least indication of a saloon or joint, and the city has but one policeman.

## OTTAWA

At least 90 per cent of the population are native born white Americans. Pop. (1890) 6,248; (1900) 6,934; (1910) 7,650.

H. J. ALLEN,  
*Editor: 'Ottawa Herald.'*

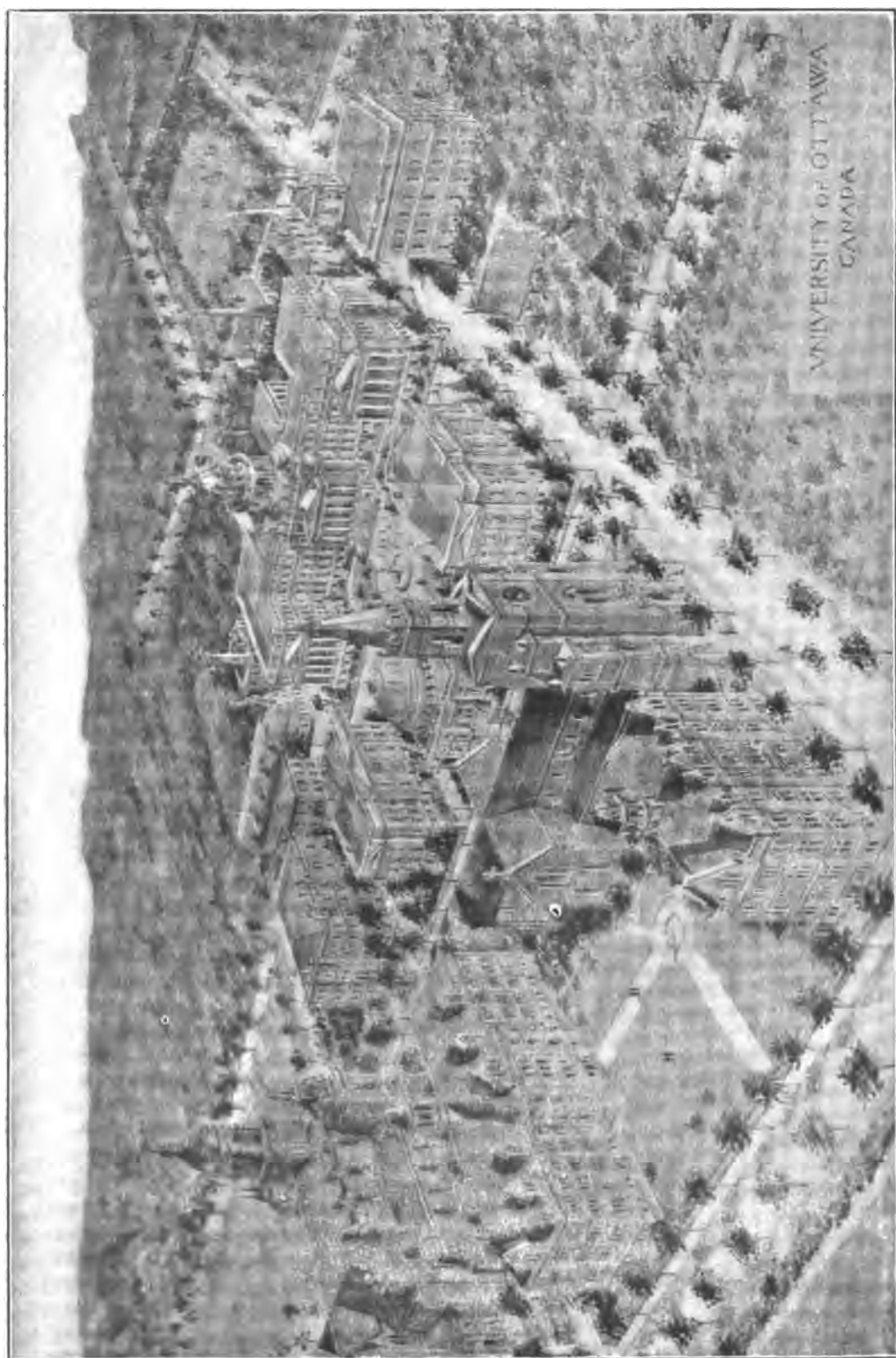
**Ottawa, Ohio**, village, county-seat of Putnam County; on the Blanchard River, and on the Findlay, Ft. W. & W., the Cincinnati, H. & D., and other railroads. It is about 90 miles northwest of Columbus. It is in a farming section, and has several industries connected with farm products and stock-raising. Its chief manufactures are flour, lumber and lumber products, clay products, and dairy products. Pop. (1910) 2,182.

**Ottawa Indians, or Ottawas**, an important American tribe of the Algonquin family formerly residing in the region of the Ottawa River in Canada, and when first met with by early French explorers, inhabiting the Manitoulin Islands and the northwest shore of the Michigan Peninsula. They comprised the Kiskakons, the Sinagos, and the Keinouches, and in their primitive state before they came in contact with white races were brave, honest, and upright, believing in a Great Creator whose eye was the sun by day, and the moon and stars by night, and who therefore could see all things everywhere, night and day, and from whom it would be impossible to hide any actions, either good or bad. They were governed by twenty-one precepts, or moral commandments, which bear a striking resemblance to the Decalogue. They also believed in certain deities who were governed by the Great Spirit over all, and who presided over various places as a country, mountain, river, lake, or island; they were careful not to express anything which might displease such deities. Michabon, the "great hare," was a mythical personage who presided over the earth and created men from animals. Mirabichi was the "god of the waters." They became the allies and friends of the French, and also of the Hurons, by which latter friendship they incurred the hatred of the Iroquois, and from whom, after the overthrow of the Hurons, they fled to the islands at the mouth of Green Bay, and thence to the country of the Sioux beyond the Mississippi. Becoming embroiled with the Sioux they were driven back, a band settling at Mackinaw, and afterward at Arbres Croche, and another band near Detroit. The Ottawas aided the French in their last war for Canada, but Pontiac (q.v.), chief of the Detroit Ottawas, would not surrender and organized a deep-laid conspiracy for the massacre of the English, in which, however, the Arbres Croche Ottawas would not join. About this time the tribe consisted of about 1,500 persons. During the Revolution they were under British influence. They joined in treaties made in 1785 and 1789, but took up arms with the Miamis soon after, again making peace in 1795, and a band about this time making a settlement on the Miami River. Numerous treaties ceding territory around Lake Michigan to the United States followed. A part went south of the Missouri in 1833, where they lost their identity. A band of Ottawas in Ohio, on 31 Aug. 1836, ceded 49,000 acres of land at Maumee, and 200 removed to 34,000 acres on the Osage, south of the Shawnees.

Those remaining became scattered. The emigrants prospered for a while, but ill-advised building projects occasioned financial troubles, and, having asked for and obtained a reservation, by common consent they removed to Indian Territory in 1870. In 1836 the Michigan Ottawas ceded all their lands except reservations, and an option was granted them of taking up lands in severalty on these reservations by the treaty of 1855. They are to be found at Arbres Croche, Grand River, Cross Village, Gull Prairie, and on the shore of Lake Superior, along with the Ojibways, the two tribes numbering nearly 5,000 members. In Canada several thousand Ottawas still survive, scattered throughout Ontario in small tribes, all Christianized and self-supporting. Consult Blackbird, 'History of the Ottawa and Chippewa Indians of Michigan' (1887).

**Ottawa**, a river of Canada, the chief affluent of the Saint Lawrence, forming the boundary between the provinces of Quebec and Ontario. It rises on the high land which divides the basin of Hudson Bay from that of the Saint Lawrence in lat. 48° 30' N., and for 300 miles, from its source to Lake Temiscamingue, runs from northeast to southwest. In portions of its course the river is very irregular in width, being lost in lakes through which it flows, while in others the waters contract to 40 or 50 yards and in many places forming beautiful cascades, fall over precipitous rocky ledges. Lake Temiscamingue is 67 miles long, and varies from a few hundred yards to nearly 10 miles wide. On leaving Lake Temiscamingue, the river, suddenly changing its direction, flows to the southeast for 400 miles, widening at its outlet into the expanse of water known as the Lake of Two Mountains and finally discharges into the Saint Lawrence at the Saint Ann's Rapids, above the island of Montreal. Calumet and Allumette islands, 75 and 95 miles respectively above the city of Ottawa, belong to Quebec. Six miles above the city of Ottawa the rapids begin, which terminate in the Chaudière Falls, 40 feet high. The Ottawa is navigable from its junction with the Saint Lawrence to the falls, and is connected with Lake Ontario at Kingston by the Rideau Canal. The river is of considerable commercial importance, from the immense quantity of fine timber cut on its banks, and on those of its tributaries, the chief of which are the Gatineau, Madawasca, Rideau, and Rivière du Lièvre. The Gatineau is 400 miles long, and the other tributaries mentioned vary in length from 100 to 250 miles. The drainage basin of the Ottawa and its tributaries is estimated at 80,000 square miles.

**Ottawa, University of**, conducted by the Oblate Fathers of Mary Immaculate, was established in 1848 by the Rt. Rev. J. E. Guigues, O.M.I., D.D. It was intrusted to the care of the Very Rev. Father Tabaret, O.M.I., D.D., and under his presidency attained a high degree of prosperity. Originally incorporated under the title of "College of Bytown," this institution received, in 1866, the title of "College of Ottawa," together with the power of conferring University Degrees. In 1883 its charter was so amended as to extend its original powers. Besides the





regular university degrees, the University of Ottawa enjoys the right of conferring the Degrees of Bachelor and Doctor in Science and Music, together with the degrees of Civil Engineering, Mining Engineering and Mechanical Engineering. The University received at the same time extensive powers of affiliation, in virtue of which, all the degrees conferred by the Faculty are officially recognized in the Dominion and in all other British possessions. By a brief, dated 5 Feb. 1889, the Sovereign Pontiff, Leo XIII., raised the University of Ottawa to the rank of a Catholic University, with all the privileges conferred on such Universities.

The programme of studies embraces six distinct courses. (1) The Theological Course, which extends over four years and embraces all the branches of ecclesiastical science generally taught in Catholic seminaries. (2) The Philosophical Course which is both the crowning of the Collegiate Course and basis of all professional studies. Students may take their degrees both in Sacred Theology and Philosophy. (3) The Course of Arts, which extends over four years, at the end of which the student may receive the diploma of Bachelor of Arts or Bachelor of Literature, after having passed the prescribed examinations. (4) The Scientific Course, which is adapted for young men who, having acquired sufficient knowledge of the classics, desire to devote their time to the study of the natural sciences and mathematics. It commences after the Collegiate Course, and lasts three years. After the necessary examination upon the various matters of the course, students may receive the degree of B.S. (5) The Collegiate Course, extending over three years and embracing all the matters necessary for matriculation. (6) The Commercial Course, the object of which is to impart to young men not destined for the literary careers, such instruction as will enable them to fill with advantage and with honor, any position for which they wish to fit themselves.

The University library, destroyed by the great fire of 2 Dec. 1903, has been partially restored and consists of 5,000 volumes. The number of students attending all departments (1904) is 460. These are recruited all over the Dominion, 15 in the United States and Newfoundland.

Since Ottawa has immense water-power at its command, and is situated in the vicinity of vast tracts of unclaimed mineral, it offers unexampled opportunities for a school of practical science giving courses in engineering. The University authorities have erected a four story Science Building, 85 x 100 feet in order to develop the Department of Applied Science. The 'Review,' a 50-page magazine, is published monthly.

W. P. O'BOYLE,

Secretary of the University.

**Ottawa University**, founded in 1865 at Ottawa, Kan. It was incorporated under the joint control of the Baptists and the Ottawa Indians; the legislature set apart 20,000 acres from the Indians' reservation for the University, with the provision that two of the six trustees should be Indians. This arrangement did not prove entirely satisfactory, and in 1873 an adjustment was made that placed the University entirely under the control of the Baptist denomination. There is a preparatory department, and in addition to the regular college instruction,

there are courses in pedagogy and business. The college work is arranged in three courses, classical, scientific and philosophical, leading to the three degrees of A.B., B.S., and Ph.B. All courses are open to women. The library in 1910 contained 6,000 volumes; the productive funds amounted to \$178,000, and the annual income was \$32,000. The students (1910) numbered 393, and the faculty 19.

**Ottendorfer**, ö't'en-dör-fër, **Oswald**, German-American journalist: b. Zwittau, Moravia, 26 Feb. 1826; d. 16 Dec. 1900. After studying law at Prague and Vienna he came to this country after the revolutionary disturbances of 1848 and, settling in New York in 1850, soon became editor of the *New Yorker Staats-Zeitung* and later its proprietor. Under his management it became the most influential German daily in America and after 1861 was independent in politics. He built and endowed an educational institution in his native town, founded a home for aged and poor men on Long Island and established the Ottendorfer free library in New York.

**Ot'ter**, a carnivorous mammal of the weasel family (*Mustelidae*). The otters differ from the weasels chiefly in their webbed feet and aquatic life. The body is elongated and averages, exclusive of the tail, about 2½ feet in length; the tail being somewhat tapering, but flattened, and serving as an efficient rudder to guide the swimming movements of the animal. The legs are short, but muscular, and exceedingly mobile; each foot possessing five webbed toes. The lips are whiskered; the ears short, and the eyes large and prominent. The under fur is short, closely set, and woolly, and the outer coat of longer and coarser hairs, of dark-brown hue. In habits the otters are chiefly nocturnal animals, swimming about at night to prey on fishes, of which they are great destroyers, leaving many mangled after merely eating part of the flesh. They wander about a great deal in winter, going across the fields from stream to stream. The burrow is constructed near the water's edge, the nest being situated at some depth in the bank of the river and lined with grass and leaves.

The American otter (*Lutra canadensis*) averages about four feet in length inclusive of the tail. The fur is of a lustrous brown color. It inhabits America generally, but is most plentiful in Canada, being rare on the Atlantic border of the United States. The Mackenzie River, and other streams running into the Arctic Sea, form noted haunts of the Canadian otter. It is chiefly noted for its fur, which is much valued commercially. A peculiar winter habit of this otter consists in numbers of these animals selecting a sloping bank of a river or a ridge of snow, and sliding down the sloping surface upon their bellies, the fore-legs being bent backward, while by means of the hind legs a swift forward impulse is given to the body. This sport (for such it really is) may be continued for a considerable time, the whole process reminding one of schoolboys similarly amusing themselves. These animals are caught in steel traps, which are set generally near the entrance to the burrow, and they have been exterminated in almost all the easily accessible streams of the country.

The European otter (*L. vulgaris*) inhabits Europe generally, and is a well-known denizen



## OTTER—OTTOMAN EMPIRE

of Scotch rivers and streams. To the salmon it is particularly destructive, a pair of otters destroying an immense number of fish, and, as already remarked, leaving large numbers in a mangled condition after each meal. The pursuit of fishes is carried on with great dexterity by the otters, the lithe body accommodating itself quickly to all the turns and gyrations of the finny prey. This otter, although usually of an untamable and somewhat ferocious disposition, can occasionally be domesticated to a very perfect extent. A species (*L. nair*) is said to be tamed in India by fishermen, and used for hunting fish; and in Great Britain tame otters have occasionally been kept for a similar purpose. The otter is still hunted for sport by means of dogs (see OTTER-HOUND) bred and trained to their work. When brought to bay the otter will defend itself with great pertinacity, and will successfully meet any single dog of ordinary strength. When forced to the water the otter swims deftly, and remains for very long periods concealed and swimming beneath the surface. On *maigre* days the Roman Catholic Church permits the flesh of the otter to be eaten. It is said to be dark-colored, rank, and of fishy taste. The fur is used, but not to any great extent.

Consult: Coues, 'Fur-bearing Animals' (1877); Stone and Cram, 'American Animals' (1902); and works on British and East Indian mammals. Compare SEA-OTTER.

**Otter**, or **Ancon Sheep**, a breed of sheep, which arose in Dover, Mass., in 1791, from a long-bodied ram which was deformed in that its legs were extremely short and bent outward, or bowed, like those of an otter. The progeny of this ram when mated with an ordinary ewe, were often deformed like the sire; and for a long period the breed was easily maintained in that district, where it was esteemed because unable to jump over low walls and fences. This case is of great scientific interest as an example of prepotency (q.v.) in a sire, and also as an example of how a sudden variation or sport may be perpetuated. It is also of interest to note that when, after a time, care was no longer taken to maintain the breed, it disappeared by crossing with ordinary sheep: the last typical specimen recorded died in 1813. Consult Humphreys, 'Philosophical Transactions' (London, 1813).

**Otter Creek**, a stream rising on the southern boundary of Rutland County, Vt., flows north-northwest through Rutland and Addison counties and empties into Lake Champlain near Ferrisburg. It is 90 miles long and is navigable for eight miles from its mouth. It supplies excellent water-power to a number of towns, the most important of which are Vergennes, Middlebury, and Rutland.

**Otter-hound**, or **Otter-dog**, a large, rough-haired, powerful, hardy, and courageous breed of hounds, cultivated especially in Great Britain to assist in otter-hunting. These dogs must be able to follow the game into the water and fight it in its retreats. A fair specimen will stand two feet tall, and weighs 65 to 75 pounds. Consult Lee, 'Modern Dogs' (1897).

**Otter-ahrew**, a very large South African aquatic shrew, which has a strange resemblance in appearance and habits to an otter. See POTAMOGALE.

**Otterbein**, *ôt'tër-bin*, **Philip William**, American United Brethren clergyman: b. Dillenburg, Germany, 4 June 1726; d. Baltimore, Md., 17 Nov. 1813. He was ordained in the Reformed (German) Church ministry at Herborn in 1749 and in 1752 was sent as a missionary to America, where he first settled at Lancaster, Pa., thereafter having charge of the congregations at Tulpehocken and York, Pa., and of Frederick, Md. At Lancaster he experienced what he termed a change of heart and as a result introduced the innovations of class-meetings, open-air meetings, and prayer-meetings, and frequently made lengthy itinerant tours, founding what later became a new sect, the United Brethren in Christ. In 1774 he assumed charge of the parish at Baltimore where he remained for nearly 40 years. He was a man of great learning and wide influence; he co-operated with the Methodist preachers who came to Pennsylvania and Maryland, and at his death the church which he had founded had in its service about 100 preachers and 20,000 members. Consult 'Life,' by Drury (1884).

**Otterbein University**, founded in 1847 at Westerville, Ohio, under the auspices of the United Brethren in Christ. It was chartered with full university privileges, and was the first educational institution established under the control of the United Brethren; it was named in honor of Philip William Otterbein (q.v.). Its organization includes a college department, a preparatory department, with a three-years' course, and post-graduate, normal, music, and art departments. The college work is arranged in two courses, classical and philosophical, leading to the degrees of A.B. and Ph.B. The university has been coeducational from the first; and there is a dormitory for the women students on the campus. The Christian Association building was the first of its kind in the State. In 1910 the library contained 10,000 volumes; the buildings and grounds were valued at over \$95,000; the productive funds amounted to \$145,000, and the annual income was \$55,000. The students numbered 500, and the faculty 30.

**Ottley**, *ôt'li*, **Robert Lawrence**, English Anglican clergyman: b. Richmond, Yorkshire, 2 Sept. 1856. He was educated at Oxford, took orders in the Established Church, was principal of Pusey House, Oxford, in 1893, and has been rector of Winterbourne Bassett, Wiltshire, from 1897. He has published 'Lancelot Andrewes' (1893); 'The Doctrine of the Incarnation' (1895); 'Aspects of the Old Testament' (1897); 'The Hebrew Prophets' (1898); 'Short History of the Hebrews' (1901).

**Otto**. See OTHO.

**Otto of Rose**. See ATTAR.

**Ottoman** (*ôt'ô-man*) **Empire**, or **Empire of the Osmanlis** (*Osnalı Vîlayeti*), comprehends all the territories more or less under the dominion of the Turkish Sultan. It includes in Europe a considerable portion of the Balkan Peninsula (the Turkish dominions here have been greatly curtailed in modern times), part being comprised in the province of Eastern Rumelia, now united to the principality of Bulgaria; part in Bosnia, Herzegovina, etc., held by Austria; in Asia, the Anatolian Peninsula or Asia Minor, a portion of Armenia and Kurdistan, Syria,

Mesopotamia, etc.; besides Samos, Rhodes, Crete, and other islands; in Africa, Egypt, and the vilayet of Tripoli (the Sudan and Tunis being lost to Turkey). The empire extends over 1,580,000 square miles, with a population of about 40,000,000, of which about 11,000,000 belong to Europe, over 17,000,000 to Asia, and about 11,000,000 to Africa. These figures refer to the Turkish empire in the largest sense, including the nominally subject states of Egypt, Bulgaria, Bosnia, Crete, etc. For further geographical details see the different countries, EGYPT, SYRIA, TRIPOLI, TUNIS, TURKEY, etc.

**Ottumwa**, 8-tūm'wā, Iowa, city, county-seat of Wapello County; on the Des Moines River, and on the Chicago, B. & Q., the Chicago, R. I. & P., the Iowa C., the Chicago, M. & S. P., and the Wabash R.R.'s; about 80 miles southeast of Des Moines. It was settled in 1849 and in 1851 was incorporated. It is in a productive agricultural region in which there are extensive coal-fields. It has good water-power which combined with abundance of coal tends to develop manufacturing industries. The chief industrial establishments are mining and agricultural implement works, foundries, iron works, pork-packing plant, flour mills, starch factory, coal and lumber yards, and grain elevators. It has a large trade in the manufactures, coal, farm products, live-stock, and fruit. The prominent buildings are the United States Government building, the Y. M. C. A. building, opera-house, the Union Railroad Station, court-house, churches, schools, and library. The educational institutions are Saint Joseph's Academy, a high school, public and parish schools, and a public library. The government is administered under a charter of 1892 and provides for a mayor, who holds office two years, and a council. Pop. (1910) 22,012.

**Otumba**, 8-toom'bā, Mexico, town, state of Mexico, on the Mexican railroad, 30 miles northeast of the City of Mexico. It is the ancient Indian pueblo of Otompan, inhabited probably by the Otomi Indians. Here Cortes defeated the Aztecs in a desperate battle 7 July 1520, during his retreat from the City of Mexico. Pop. (estimated) 2,500.

**Otway**, 8t'wā, Thomas, English dramatist: b. Trotton, Sussex, 3 March 1652; d. Tower Hill, London, 14 April 1685. He was educated at Winchester College, and at Christ Church, Oxford. An appearance on the stage in Mrs. Aphra Behn's company in London in 1671 was unsuccessful, and he returned to Oxford for a time, only to leave without a degree in 1674, and after a year in the army to return to London as an author. 'Alcibiades' (1675) and 'Don Carlos' (1676), especially the latter, which may be paralleled with Schiller's play, being taken from the same French original by St. Real, were unusually well received and won for Otway the favor of Betterton. Adaptations of Molière and Racine followed, and in 1678 Otway essayed the comic with the prose play 'Friendship in Fashion,' another great success in his own day, though marked by much indecency. But Otway did not profit by his success, what with drink and various amours, notably his passion for Mrs. Barry, who played in most of his plays, and was mistress of the Duke of Rochester. He left London for the army (1678-9), and upon his return wrote 'The Or-

phan' (1680), a comedy called 'The Soldier's Fortune' (1681), 'Venice Preserved' (1682), and another comedy 'The Atheist' (1684). The two comedies are little better than worthless; whereas the two tragedies, 'Venice Preserved,' ranking the higher, are by far the most powerful of the contemporary stage, being remarkable particularly for the simple and strong delineation of the passions, and being generally held the most pathetic and provocative of tears of the whole English drama. Otway wrote much miscellaneous verse, satires, dedications, prologues and epilogues, but all contemporary and early biographers agree that he died in want, though they differ as to details. 'Venice Preserved' enjoyed a European repute, there being versions in French, Dutch, German, Russian, and Italian; with 'The Orphan' and 'The Soldier's Fortune' it is contained in the 'Mermaid Series' (1891). A complete edition of Otway is that by Thornton (1813). Consult: De Grisy, 'Étude sur Thomas Otway' (1868); Mosen, 'Ueber Thomas Otways Leben und Werke' (1875); Löwenberg, 'Ueber Otways und Schillers Don Carlos' (1886).

**Ouachita** (wāsh't-tā) College, established at Arkadelphia, Ark., in 1886, under the control of the Baptist denomination. The work of the college is in two courses, classical and literary, and the degrees of bachelor of arts and bachelor of letters are conferred. There is also a preparatory department. The college is coeducational, and the number of women in attendance averages about one-half the total number of students. The income is derived from tuition fees, there being no endowment; in 1910 the income amounted to \$65,000; the grounds and buildings were valued at over \$80,000. The library contained 3,500 volumes; the students numbered 416, and the faculty 30.

**Ouakari**, wā-kā're, a South American monkey of the genus *Brachyurus*, remarkable for the extreme shortness of the tail, and for the great length of the whitish hair upon the body, while the head is almost bald and the bare skin of the face is brilliant red. These small monkeys abound in the Brazilian forests, where three species are known, and one of which (*B. uakaria*) is among those most often seen and best liked as pets.

**Ouananiche**, wā-nā-nēsh', a land-locked relative of the Atlantic salmon, named *Salmo ouananiche*, and often written winninish, wan- aniche, and in various other ways. It inhabits various lakes and ponds in eastern Quebec and Labrador, but is most familiar in and about Lake Saint John, north of Quebec. From most of its stations it can go to and return from the sea if it pleases, but never seems to do so. This salmon differs very little from a typical salmon except in its smaller size, and most ichthyologists have held it, and the similar Sebago salmon, to be only local varieties of *Salmo salar*; but Jordan now regards both as separate species. The largeness of the eye and of the black spots are conspicuous distinguishing characteristics among others. "As a game fish," says Jordan, "those who have had experience with the ouananiche think it has no equal. They may be taken at any time between the going out of the ice and the middle of September, though the best fishing is said to be late in May. During the early part of the season it may be taken with bait of

worms, pork, pieces of chub or even ouananiche itself along the shore of Lake Saint John. It is occasionally taken then with the artificial fly, but fly-fishing for the ouananiche is usually not a successful method of capturing it." The literature of American angling abounds with descriptions of this fish and its sport, and special treatises upon it have been written by McCarthy, Chambers, Van Dyke and others.

**Oubliette**, oo-blî-ët', a secret dungeon or pit constructed in old castles, forts and other buildings, in which were confined persons condemned to perpetual imprisonment or to secret death. It was usually entered by a staircase or steps reaching to the top of a chamber, in the floor of which was an opening into the dungeon. This opening served also for the admission of light and air.

**Oudh**, owd, or **Oude**, British India; (1) a town, the former capital of the province of Oudh, on both banks of the Gogra, 77 miles east of Lucknow. It is greatly venerated by Hindus; but its ancient temples are in ruins, and its only structures deserving notice are a mosque built by Aurungzebe, some Mohammedan tombs, and an iron bridge across the river. Pop. 12,000. (2) a semi-independent province politically attached to and forming with Agra, the United Provinces of Agra, and Oudh (q.v.) prior to 1901 known as the Northwest Provinces. Oudh is bounded on the north by Nepal and on the other sides by Agra, the lieutenant-governor of which administers Oudh as chief-commissioner since 1877. Oudh is distinguished by an independent judicial system. The area is 23,066 square miles; the surface mostly level, very fertile, and watered by the Gogra, Gunti, and other tributaries of the Ganges. The Ganges itself forms nearly all its southern boundary. Among the inhabitants are numerous Rajputs; many of the population are Mussulmans. Oudh was formerly a Mogul province, and became subordinate to the British after the battle of Kalpi in 1765. In 1801 Gorakhpur and some other eastern districts were annexed from this territory to the British dominions. In 1819 the vizier threw off his nominal dependence on the Mogul sovereign, and assumed the title of king.

A disputed succession, and partial revolt in 1837, were the chief subsequent events until 1856, when complaints of misgovernment led to the annexation of the country to the British dominions, an annual pension of £120,000 being settled on the king. This measure, however, produced much dissatisfaction, and when, in 1857, the Mutiny broke out, most of the Oudh sepoys joined it, and the siege of Lucknow resulted. (See INDIAN MUTINY.) Agriculture has made great advances, the area under crop having largely increased. Wheat, barley, rice, sugar, indigo, and other products are raised in large quantities; in some districts a vast amount of nitre effloresces on the soil. Numerous schools have been established. Oudh includes the two divisions of Lucknow and Faizabad. Lucknow is the capital; other towns are Faizabad, Shahabad, and Bharaich. Pop. about 13,000,000.

**Oudinot**, oo-dê-nô, **Charles Nicolas**, DUKE OF REGGIO, French marshal: b. Bar-le-Duc, France, 26 April 1767; d. Paris, France, 13 Sept. 1847. Entering the army he had attained the rank of captain at the outbreak of the Revolu-

tion. He joined forces with the populace but crushed an uprising in his native district in 1790 and in 1794 was given command of a brigade. In the war with Prussia and Austria he won distinction, in 1799 became general of division, and was thereafter much trusted by Napoleon, receiving the command of 10 battalions in 1805. He was at Austerlitz and Jena, and at Ostrolenka, Russia, in 1807 he routed the Russians; at Friedland in 1807 and at Wagram in 1809 his bravery was so marked that after the latter battle he was made marshal of France and Duke of Reggio. In 1810 he occupied Holland and in the unfortunate campaign against the Russians in 1812 he earned high praise for his skilful generalship. In the battles between the French and the Allies he played a prominent part and was loyal to Napoleon to the last, but after the restoration of the Bourbons took office under them. In 1823 he led the invading army into Spain, acted as governor of Madrid for a time, and became governor of the Invalides in 1842.

**Oudinot**, **Charles Nicolas-Victor**, DUKE OF REGGIO, French general, son of the preceding: b. Bar-le-Duc, France, 3 Nov. 1791; d. Paris, France, 7 July 1863. He was a prominent figure in the war in Algeria, was later appointed commander-in-chief, and in 1848 led the attack upon Rome. For his protests against the *coup d'état* in 1851 he was arrested, but his release followed shortly whereupon he retired from public life.

**Ouida**, oo-ê-da, pen name of LOUISE DE LA RAMÉE, English novelist: b. Bury St. Edmunds 1840; d. Florence, Italy, 25 Jan. 1908. She had a French mother and her father was an Englishman. She began to write for periodicals in the early 60's, using as a pseudonym her Christian name as pronounced by a baby sister. About 1868 she left London for Italy, and resided in Florence. Her novels, which have been very popular though abounding in over-wrought sentiment are exceedingly dramatic and are not without literary merit. A few of the many titles are: 'Held in Bondage' (1863), 'Strathmore' (1865), 'Under Two Flags' (1867), 'Trecotrin' (1869), 'A Dog of Flanders' (1872), 'Two Little Wooden Shoes' (1874), 'In Maremma' (1882), 'Ruffino' (1890), 'The New Priesthood' (1893), 'The Mascarenes' (1897), 'The Waters of Edera' (1900), and 'Street Dust' (1901).

**Ouistite**, wis'tî-tî. See MARMOSET.

**Ouless**, oo-lès', **Walter William**, English painter: b. St. Heliers, Jersey, 21 Sept. 1848. He was educated at Victoria College in his native town, and at 16 became a student at the Royal Academy where he has been a constant exhibitor since 1869. He was elected an associate in 1877, and a full member in 1881. About 1872 he applied himself to portrait-painting, in which he has attained a high rank. Among his sitters have been Darwin, Bright, Cardinals Newman and Manning, Lord Roberts, Frederic Harrison, and the Duke of Cambridge. He was awarded a gold medal at the Paris International Exhibition of 1878, and also at the Berlin Exhibition of 1886.

**Ounce**, (1) the snow-leopard (q.v.); (2) in South America the jaguar (q.v.).

**Ounce**, a twelfth part of any magnitude, whether of length, surface, or capacity. In

## OUR AMERICAN COUSIN—OUSELEY

Troy weight the ounce is the 12th part of the pound; in avoirdupois the ounce is the 16th part of a pound. See **WEIGHTS AND MEASURES**.

**Our American Cousin**, an English comedy by Tom Taylor, produced in 1858. There is a Yankee character in the play, originally created by Joseph Jefferson (q.v.). Lincoln was in attendance at a performance of this comedy at Ford's Theatre, Washington, when he was assassinated.

**Our Lady of Good Counsel, Sisters of.** See **ORDERS, RELIGIOUS**.

**Our Lady of the Holy Rosary, Congregation of.** See **ORDERS, RELIGIOUS**.

**Our Lady of Lourdes.** See **ORDERS, RELIGIOUS**.

**Our Lady of Lourdes, Brothers of.** See **ORDERS, RELIGIOUS**.

**Our Lady of Mercy, Military Order of.** See **ORDERS, RELIGIOUS**.

**Our Lady of Perpetual Help, Sisters of.** See **ORDERS, RELIGIOUS**.

**Our Lady of Sion.** See **ORDERS, RELIGIOUS**.

**Our Mutual Friend**, a novel by Charles Dickens, published in England in 1864-5. The scene is laid in London and its immediate neighborhood. Among the characters which this story has made famous are Miss Jenny Wren, the doll's dressmaker; Bella Wilfer, "the boofer lady"; the Golden Dustman, Mr. Boffin; and Silas Wegg, employed by Mr. Boffin, who is, at first, delighted with the services of "a literary man with a wooden leg."

**Ouray**, oo-rá', Indian chief: b. Colorado 1820; d. Los Pinos Indian agency (Colo.) 27 Aug. 1880. He was the leader of the Uncompahgre Utes, and while protecting the interests of his tribe was friendly to the whites. He spoke and wrote the Spanish language. Several times he visited Washington to appeal on behalf of his people.

**Ouray**, Colo., town, county-seat of Ouray County; on the Uncompahgre River and on the Denver & R. G. railroad; 160 miles west-southwest of Colorado Springs. It is at an elevation of over 7,000 feet, at the base of Mount Hayden, and in a region of grand mountain scenery. Its hot springs make it a favorite health resort. It is also the local trade centre and shipping point of the surrounding mining region, which is rich in gold and silver. It contains a miners' hospital. Pop. (1890) 2,534; (1900) 2,196; (1910) 1,644.

**Ouro-Preto**, ô'roo prâ'too, Brazil, city, state of Minas Geraes; 175 miles north of Rio de Janeiro. Rich gold deposits were found in the vicinity and the chief industry was formerly mining, but the mines have mostly been abandoned and the prosperity of the city has in consequence declined. It was originally the capital of Minas Geraes, but the state government was moved to Minas in 1894. It is built on several hills and surrounded by mountains; the streets are narrow and irregular, but some of the modern houses are well built. It is connected with Rio Janeiro by rail, and with the towns to the north and east by highway, and carries on an active trade.

**Ouse**, ooz, England, (1) a river of Yorkshire also called the **NORTHERN** or **YORKSHIRE Ouse**, formed by the junction of the Swale and

Ure, and after a southeast course of 60 miles, uniting with the Trent to form the estuary of the Humber. It is navigable for large vessels 45 miles to York. Its principal affluents are the Wharfe and the Aire from the west, the Don from the south, and the Derwent from the north. (2) The **GREAT OUSE** rises near Brackley in the county of Northampton, flows in a general northeasterly direction, traverses the counties of Buckingham, Bedford, Huntingdon, Cambridge, and Norfolk, and falls into the Wash at King's Lynn, after a course of about 160 miles, for the latter two thirds of which it is navigable. Among its affluents is (3) the **LITTLE OUSE** or **BRANDON RIVER** which joins it at the confluence of the river Stoke, and the New Bedford and Wisbech canal.

**Ouseley**, ooz'li, **SIR Frederick Arthur Gore**, English composer and musician: b. London 12 Aug. 1825; d. Hereford 6 April 1889. He was a son of Sir Gore Ouseley (q.v.). He was graduated B.A. in 1846 from Christ Church, Oxford; succeeded to the baronetcy by his father's death in 1844, took orders, and held several metropolitan curacies in 1840-51. Having graduated as Doctor of Music at Oxford in 1854, he was appointed precentor of Hereford Cathedral in the following year, and also became professor of music in the University. In 1866 he was made a canon residentiary of Hereford Cathedral. From earliest childhood Ouseley showed remarkable musical ability and extraordinary accuracy of ear. He composed an opera of great promise when only eight. His published compositions include two oratorios, 'The Martyrdom of St. Polycarp' (1855), and 'Hagar' (1873); a large number of anthems, of which several are very well known; many full church services; numerous chants, hymn-tunes, and carols; a sacred cantata; besides overtures, glees, solos, and quartettes. He wrote three valuable works on musical theory: 'A Treatise on Harmony' (1868); 'A Treatise on Counterpoint, Canon and Fugue' (1869); and 'A Treatise on Musical Form and General Composition' (1875). He was the founder of the church and college of St. Michael, Tenbury (1856) and to it bequeathed his splendid musical library.

**Ouseley**, **Gideon**, Irish Methodist clergyman: b. Dunmore, Galway, Ireland, 24 Feb. 1762; d. Dublin, Ireland, 13 May 1839. Educated in the Roman Catholic faith he became a member of the Wesleyan Church and as a local preacher attained considerable influence over Protestants and Catholics alike although not infrequently assaulted while engaged in street preaching. As an Irish missionary he was held in high regard by the Wesleyans, his preaching being of a most successful character and his zeal unflagging. He wrote: 'A Short Defence of the Old Religion' (1812); 'Rare Discoveries' (1829); etc.

**Ouseley**, **SIR Gore**, English diplomat and Orientalist: b. Limerick, Ireland, 24 June 1770; d. Beaconsfield, Buckinghamshire, England, 18 Nov. 1844. In 1787 he went to India, where he engaged in business, and also gave considerable attention to the study of Oriental languages and customs, particularly the Persian, Bengalese and Hindu. On his return to England he was made a baronet (1808), and in 1810 was appointed English ambassador extraordinary to

Persia, and through his intimate knowledge of the Persian language and his skilful diplomacy was successful in obtaining a definitive treaty between England and Persia, which was finally ratified in 1814. He was also instructed in 1813 to mediate between Russia and Persia, and through his efforts a treaty was signed, suspending war between the two nations. In 1815 he returned to England, and in 1820 was admitted to the privy council. He was an able Oriental scholar, was one of the founders of the Royal Asiatic Society of London, and in 1842 became president of the Society for the Publication of Oriental Texts. 'The Gulistan of Musle-Huddeen Shaik Sâdy of Sheerez' was printed under his direction (1809); his own work, 'Biographical and Explanatory Notes on the Persian Poets' was published after his death (1846).

**Ouseley, Sir William**, English Orientalist: b. Monmouthshire, England, 1767; d. Boulogne, France, September 1842. He was educated privately and later in Paris, but in 1788 he entered the army. Tiring of military life and desirous of continuing his study of oriental languages he left the army in 1794 and entered the University of Leyden. Thereafter he devoted himself to further study and to literature, but in 1810 accompanied his brother, Sir Gore Ouseley, ambassador to Persia, as his private secretary. He published: 'Oriental Collection' (1797-9); 'Travels in Various Countries of the East' (1819-23); 'Anecdotes from Oriental Bibliography' (1827); etc.

**Ouseley, Sir William Gore**, English diplomat: b. London 26 July 1797; d. there 6 March 1866. He was the son of Sir William Ouseley (q.v.). He was early engaged in the diplomatic service; and in 1825 was connected with the British legation at Washington, and at that time married a daughter of the governor of Vermont. He later was appointed to several responsible diplomatic positions in South America; and was sent on special missions to the United States and to Central America. He published: 'Remarks on the Statistics and Political Institutions of the United States' (1832); 'Notes on the Slave Trade' (1850); and 'Views in South America, from Original Drawings' (1852).

**Outagami**, a name applied to the Fox Indians (q.v.).

**Outlanders.** See **UITLANDERS**.

**Outlawry**, an ancient custom in Great Britain of putting a person out of the protection of the law; thus an outlaw could be killed at sight like a wild beast. Outlawry in civil proceedings was formally abolished in 1879. In an act passed in 1870, however, abolishing forfeitures for treason and felony, it was expressly stated that nothing in the act was to affect the law of forfeiture consequent upon outlawry. But there is little need now for outlawing absconders from justice, since in most cases they can be laid hold of under treaties of extradition with foreign countries. The effect of outlawry is the forfeiture of the goods of the outlaw to the crown, and he cannot receive and hold property given or devised to him. In the United States, outlawry was recognized in the Colonial days, but since the War, of the Revolution the practice has been obsolete.

**Outram, oo'tram**, **Sir James**, English soldier: b. Butterly Hall, Derbyshire, 29 Jan. 1803; d. Pau, France, 11 March 1863. He was educated at Marischal College, Aberdeen, and in 1819 went to India, where after commanding for some time a body of irregular troops he was appointed adjutant to the 23d Bombay Native Infantry. From 1835 to 1838 he was employed in subduing the rebel chiefs of the Mahhi-Kanta. In the last-mentioned year, as adjutant to Lord Keane, he took part in the Afghan war, and distinguished himself at the capture of Khelat, and by his dangerous ride disguised through the enemy's country (1839). In various other capacities he displayed military talents of a high order, as well as admirable administrative qualities. In 1842 he was appointed commissioner to negotiate with the Ameer of Sindh, in which position he adopted views at variance with the aggressive policy of General Sir Charles James Napier, and the consequence was an acrimonious correspondence between the two soldiers, carried on, however, by both in a spirit of good faith. Sir James had the satisfaction in the end of knowing that his views were confirmed by the directors. His opponent gracefully styled him publicly the Bayard of India. In 1854 he was appointed to the residency of Oudh. He successfully conducted the war against Persia. He landed at Bushehr 27 Jan. 1857, and by a series of brilliant victories brought the war to a satisfactory conclusion in three months. At the beginning of the Mutiny he had command of two Bengal divisions, and was chief commissioner of Oudh. During the first relief of Lucknow, however, he waived his rank and served as a volunteer under Havelock. He commanded at Lucknow until the second relief (by Sir Colin Campbell), directed the evacuation, and held the place until the third relief. He was made lieutenant-general and received various and suitable recognition of his important services. A bronze statue of Outram by Noble was erected in the gardens of the Thames embankment.

**Outworks**, in warfare. See **FORTIFICATION**.

**Ouzel**, oo'z'l, an old name, derived from the German, for several thrush-like birds of Great Britain and the United States. The name is most often applied in England to the black-bird (q.v.), and to the larger thrush (*Turdus torquatus*), distinguished by the broad lunate stripe of white across the breast and sides of the neck, which is provincially known as ring, rock, mountain or tor ouzel. The name is also given, in the form "water-ouzel," to a small closely related bird (*Cinclus aquaticus*), other species of which occur in various mountainous parts of the world, all very similar in appearance and habits. One species (*C. mexicanus*), is numerous in the Rocky Mountain region—a small, robust, short-tailed, short-winged, dark-colored bird which haunts the mountain-streams, and is commonly known as "dipper," on account of its remarkable facility in diving. Its food consists almost exclusively of snails, young insects, and other organisms which live in and about the streams; and it has the power of seeking these under water, not only by diving, but by partly swimming and partly walking with fluttering wings along the bottom in search of its prey, remaining there "two or three minutes" if it

pleases. It is a common bird in both the Rocky Mountains and in the Coast Ranges; and makes a large globular nest of mossy materials which it lodges in some crevice near a stream, often beneath the veil of a cataract. Consult: Muir, in 'Scribner's Monthly' (1878); Keyser, 'Birds of the Rockies' (1902); Coues, 'Birds of the Northwest' (1874); and British ornithologies.

**Ovampo**, ô-vâm'pô, a people of the Bantu race residing in German southwest Africa. They are divided into separate tribes, and are said to number about 120,000. They are of very dark complexion, tall and robust, and remarkably ugly. The hair is short, crisp, and woolly. The men often shave it off, leaving the crown untouched; but the women stiffen it with a kind of red paste, in the manner practised in many other parts of Africa. The principal ornaments are heavy iron anklets, a profusion of cowries and other shells, and beads of every size and color, so arranged as to hide a considerable part of the person. Their staple food is grain. The houses are of a circular form, with a circuit of 16 feet and a height not much exceeding 4 feet. These huts, arranged in groups are enclosed by strong palisades. The domestic animals are oxen, sheep, goats, pigs, dogs, and poultry. The arms consist of bows and arrows, a dagger, assegais, and knob-kerries. Though thus provided with weapons the Ovampo are peacefully disposed and industrious.

**Ovando**, ô-vân'dô, **Nicolás de**, Spanish soldier and administrator: b. Valladolid, Spain, about 1460; d. Madrid, Spain, about 1518. In 1501 he was appointed successor to Boabdilla as governor of Hispaniola; in February 1502 he sailed from Spain with a fleet of 30 ships and 2,500 persons in his company and landed at San Domingo. Almost his first act as governor was to refuse aid to Columbus whom he would not allow to land at San Domingo and he permitted months to pass without sending aid when he knew Columbus was in sore straits at Jamaica. His treatment of the Indians was cruel in the extreme and one of the blackest deeds in his career was his treacherous massacre of the 84 caciques of Queen Anacaona at Xaragua, and her subsequent execution. In the course of his despotic rule the number of Indians in his province was reduced to 60,000 in 1507 against 500,000 at the arrival of the Spaniards. Aside from his treatment of the Indians Ovando was an able governor and the colony flourished. He was recalled in 1509.

**Ovariectomy.** See **OVARY**.

**Ovary**, one of the paired glands which form the essential part of the organs of generation in the female, and produce the eggs or ova; it is homologous to the testis of the male, where spermatozoa originate. The ovaries are two elongated oval bodies, flattened from above downward, one on each side of the uterus, attached to the broad ligament. Each ovary is about 1½ inches in length, and ⅓ inch thick. It consists of many ovisacs, or Graafian follicles or vesicles (in which the ova are developed), imbedded in a stroma or framework, and also of blood-vessels, nerves, and lymphatics, and is invested with a serous covering or membrane derived from the peritoneum. In females who have never menstruated, the surface of the ovary is smooth; after menstruation has been established it is rough and marked with scars,

due to the rupture and closure of the Graafian vesicles. At undetermined periods, from puberty on, probably at or near the time of menstruation, the fluid (liquor folliculi) within certain ovisacs increases, distention of the sacs occurs, and a rupture at the weakest point, with discharge of the ovum. This is ovulation, the function of the ovary. Most physiologists believe that ovulation is associated with menstruation, but some writers contend that menstruation may occur without accompanying ovulation, and *vice versa*. Usually the ova, when discharged, are conveyed through the Fallopian tubes (q.v.) to the uterus. If the ovum unites with the spermatozoa of the male it becomes impregnated or fertilized. After the discharge of the ovum, the Graafian vesicle usually fills with blood, which coagulates. The coagulum, squeezing out the serum, becomes decolorized, its periphery assumes a yellowish color and the resultant spot is the corpus luteum. The corpus luteum of pregnancy is larger and remains for a longer time than that formed when pregnancy does not occur.

**Diseases of the Ovaries.**—The affections of the ovaries may be classified as malformations, displacements, functional disorders, inflammations, and tumors. One or both ovaries may be congenitally absent. This condition is rare, and when it does occur it generally coexists with a want of development of the vulva, vagina, and uterus. Sometimes the ovaries are undeveloped. In both these conditions the women lack constitutional vigor and development. Displacement of the ovary into the inguinal canal, or labia majora (hernia), is generally congenital, but may be caused by a strain or fall. Pro-lapse or dislocation of the ovary, causing it to sink downward toward the pelvic floor, results from a disturbance of the delicate adjustment of the organ, by an abnormal increase in its weight, a weakening of its supports, or an unusual traction upon it. The functional affections are neuralgic in character. Ovarian neuralgia (ovarialgia or oöphoralgia), of which the principal symptom is sharp local pain, is frequently associated with hysteria or other neuroses, headache, intercostal neuralgia, etc., and it may be caused by a local engorgement or induration pressing on sensitive nerves. Inflammation of the ovary (ovaritis or oöphoritis) may be acute or chronic. The acute form is often preceded by hyperæmia, or an excess of blood-supply at the time of the monthly period, from some obstruction of the venous circulation. Pain in the ovarian region, especially during menstruation, inability to walk, and painful defecation are the principal symptoms of acute ovaritis. The inflammation is frequently associated with pelvic cellulitis and peritonitis and may be caused by injuries, gonorrhœal infection, puerperal sepsis, and the acute exanthemata. Sometimes abscesses form, or sterility results. Chronic ovaritis is usually the result of an inflammation, acute or subacute, but may be caused by self-abuse, sexual excitement, etc. The connective tissue of the ovary thickens, decreasing the size of the organ (cirrhosis) and tends to the formation of cysts, that is to say, cystic degeneration. A sickening pain, tenderness, and reflex neuralgias are symptoms. The tumors of the ovary are carcinoma, fibroma, and cystic tumors.

**Ovariectomy.**—This is the operation of modern surgery for removal of ovarian tumors



## OVEN — OVERBECK

or of ovaries themselves. It was first performed in 1809, and long considered exceedingly dangerous, but has been performed with great and increasing success, especially since the adoption of antiseptic treatment. See ANATOMY, COMPARATIVE.

**Oven**, a closed, box-like chamber of any description in which a considerable degree of heat may be generated, used for baking, heating, or drying any substance. The term is usually restricted to a close chamber for baking bread and other food substances; but ovens are also used for coking coal, in the art of metallurgy, in glass-making, pottery, etc. There is now a great diversity in the shape and materials of construction, and modes of heating ovens. The old type of baker's oven, still very largely used, is a low arched chamber either of brick with a tile or stone sole, or built entirely of stone. The door is in front, and the pans of dough are put in with a long wooden spade. In one class of these ovens the fireplace or furnace is placed in the front corner, with an opening admitting the products of combustion directly into the oven, while there is an exit flue on the other side. A remarkable apparatus for the economic preparation of food both as regards the expenditure of fuel and the saving of waste is the Aladdin Oven, invented by Edward Atkinson, of Boston. This apparatus has been developed from a study of the Scandinavian Cooking Box, much used in Norway and Sweden. This box consists of an outer case of wood or other non-heat-conducting material, lined with hair felt. Into this cavity a metallic box, containing food with sufficient liquid heated to the boiling point, is placed and tightly closed in. The heat is thus retained for a long period, completing the process of cooking. On this basis was devised an outer oven of non-heat-conducting material in which, separated by a sufficient space for the circulation of heat, is placed a metallic oven or cooking chamber. Heat is passed from the top of a round-wicked kerosene lamp through a hole in the bottom of the outer oven. This heat passes around the entire inner oven, the products of combustion passing out at the same orifice at which the heat entered. There is no direct communication between the lamp or source of heat and the cooking chamber. By this apparatus a normal temperature can be maintained for a definite number of hours, either at the temperature of simmering or stewing at about 160° F., or at the temperature for baking and roasting not exceeding 300° to 320° F. By suitable arrangements thereto very little difference in temperature is found between the top and the bottom of the oven. The heat can be regulated by the size of the lamp and height of the flame. Meats, fish, vegetables, and puddings can be cooked in the same chamber without the flavor of one being imparted to the other, the heat being kept below the distilling point of the animal fats or of the fruit and vegetable juices. In this apparatus two pounds of kerosene oil are computed to do the work of 120 pounds of anthracite coal burned in the ordinary stove or range and to do it in a more wholesome and appetizing manner. The patents on this apparatus have been dedicated to public use.

**Oven Birds**, birds belonging to the sub-family *Furnarine*, in the family *Dendrocolap-*

*tida* (tree-creepers). The oven-birds are found in tropical America, and Argentina, and are all of small size, and feed upon seeds, fruits, and insects. They walk on the ground with great ease. Some of these forms appear to frequent the shore, where they feed upon small mollusks and crabs. They are said to be exceedingly tame: the best-known species—(*Furnarius fuliginosus*) haunting village gardens and seeming to court the company of man. Their popular name is derived from the form of the nest which they construct. It is built of straws and dried leaves mixed with clay, and resembles an oven in its conical shape, being about eight inches in diameter. The walls are about an inch thick. The aperture exists at the side, and the interior is divided by a partition-wall into two rooms, in the inner of which the eggs are deposited. The nest is placed on a high and generally exposed site. Other species make strange nests of various kinds, one being a massive cylinder of mud.

In the United States the name oven-bird is commonly given to the golden-crowned water-thrush, a small terrestrial warbler, which builds a covered nest on the ground in the woods. See WATER-THRUSH.

**Ovenshine, Samuel**, American military officer: b. Pennsylvania 2 April 1843. He entered the Union army at the outbreak of the Civil War in 1861 and was commissioned 2d lieutenant, rising to the rank of captain in 1864. He continued in the army after the close of the War and in 1898 was appointed brigadier-general of volunteers, and in 1899 was made brigadier-general of regulars and placed in command of a brigade in the Philippine Islands. In the year last named he was retired from active service.

**Overbeck, d'vër-bëk, Johann Friedrich**, German painter: b. Lübeck 4 July 1789; d. Rome 12 Nov. 1869. He became very early imbued with the spirit of romanticism (q.v.) and on commencing his art studies at Vienna 1806, found at the Academy congenial friends in Pforr, Vogel, and others of the same school. Their devotion to the old Flemish and Italian masters met with much criticism and opposition in the academy and in 1810 Overbeck left for Rome where he associated himself with Schadow in the development of their common ideals. In the following year Cornelius joined their company and a little later Philip Veit and J. Schorr united with them in the formation of an artistic brotherhood. Their headquarters was the studio in the monastery of Saint Isidore, and they professed their object to be the religious and moral in art. Their aim was the revival of German art on the lines quattrocentists (q.v.) of Italy. They were first known as the Monastic Brotherhood of Saint Isidore and later as Nazarenes (q.v.), of whom Overbeck was the acknowledged leader. The first important work which they executed was the history of Joseph in the 'Casa Zuccara' near the Trinità de' Monti, then occupied by Consul-General Bartholdy. Overbeck painted there the 'Selling of Joseph' (1816) the cartoon for which is now in the city museum at Frankfurt. He also contributed 'The Seven Lean Years' (1851). Five of the frescoes illustrating Tasso's 'Jerusalem Delivered' in the villa of the Marchioness Massimi, are also his work. He decorated with

## OVERBURY — OVERSTONE

frescoes the church of Santa Maria at Assisi, and among his numerous oil paintings examples are to be found in Saint Martin's Church, Lübeck, the New Picture Gallery at Munich, and the Berlin National Gallery. The last remarkable pictures which he executed were the 'Coronation of the Virgin,' now in the City of Mexico; and 'Jesus Descending from the Hill of Nazareth,' in the museum of Antwerp. All his work is distinguished by refined drawing, noble composition, and a profound spirit of devotion, and these characterize the 40 well-known designs illustrating New Testament history, all of which have been engraved, and some of them printed in colors. Among the founders of the German Romantic School of painting Overbeck is the only one who kept unflinching to the original programme of the Nazarenes. His productions are of rare excellence in the perfection of the grouping, in directness and simplicity of expression, and a purity of outline which recalls Perugino and the earlier style of Raphael. A sincere religious spirit pervades every conception, and the corporeal is dominated by the spiritual in all his refined ascetic forms and faces. It would seem that his love of the ecclesiastical and monastic type of character, and his enthusiasm for mediævalism, had much influence in his conversion to the Roman Catholic Church (1813). He exercised great influence as professor in the Academy of San Luca at Rome, and his most noted pupils were S. Steinfels and Führich. Consult: Atkinson, 'Life of J. F. Overbeck'; Dohmes, 'Kunst und Künstler des 19. Jahrhunderts' (1883-95).

**Overbury**, ô'vêr-bêr-î, Sir Thomas, English author: b. Ilmington parish, Warwickshire, 1581; d. London 15 Sept. 1613. He was educated at Queen's College, Oxford. He became adviser to the Earl of Rochester, then Robert Carr, at the court of James I., and provoked the anger of the Countess of Essex by endeavoring to dissuade his friend from marrying her. Rochester had the address to procure the imprisonment of Overbury in the Tower of London, where he was slowly poisoned by secret agents. Carr (then Earl of Somerset) and Lady Essex were convicted but pardoned. Overbury was highly cultured and was credited by Jonson with the introduction into court circles of intelligent appreciation of literature and art. His best remembered work is his 'Characters,' published as an appendix to his poem 'A Wife' (1614). Selections from 'Characters' were issued in 'The Cornhill Booklet' for August 1901.

**Overcomers**, a name commonly applied to a religious society originated in Chicago, but now dwelling at Jerusalem, where they style themselves the "American Colony in Jerusalem." They have all property in common and have abolished among themselves the institution of marriage. They profess to have discovered the true interpretation of the Bible, by which all nations are to be brought into liberty, righteousness and love.

**Overland Route**, a popular term applied to the route to California as distinguished from the route via the Isthmus of Panama. Also a term first used for the route from Europe to India via Egypt, the desert, and Suez. It was in contradistinction to the Cape route which was

by water only. It became more applicable in 1837, when the route was across the European continent by Marseilles; in 1845, when that by Trieste followed; and in 1872, when that via the Mount Cenis tunnel and Brindisi came into use. It also came into use in 1899 for the land route from Victoria, B. C., to the Alaskan gold fields.

**Overseers of the Poor**, in the United States, are county officers whose duty is to make provision for the maintenance of the poor of the county. In New York and a few other States this duty devolves upon the county supervisors. In Great Britain overseers are public officers appointed annually in every urban district for the purpose of raising by rate on the inhabitants the sums necessary for the relief of the poor, and applying such sums to their relief. They have been appointed since the time of Queen Elizabeth by the important poor law act then passed. Their appointment must take place on the 25th of March, or within a fortnight thereafter. Peers, members of Parliament, clergymen of any denomination, barristers, attorneys, doctors, military and naval officers, and others whose avocations require continual personal attendance are exempt from serving the office. All who are not exempted by some statute, and even women, are liable to be appointed, and it is an indictable misdemeanor to refuse without good cause to serve when duly appointed. The office is gratuitous, and no person is to be appointed overseer who is directly or indirectly concerned in any contract for the supply of any goods, materials, or provisions for the workhouse or for the relief of the poor of the district. In granting relief, overseers have no discretionary power except in extreme emergencies, and in no case is the relief to be in money.

**Overskou, Thomas**, Danish dramatist: b. Copenhagen 11 Oct. 1798. When only 20 years of age he had become possessed of some dramatic talent and began to play minor parts. In 1842 he retired with a pension; in 1849 he became manager under Herberg, whom he succeeded in 1856, but in 1858 retired. His first play, '1826,' written in 1826, was a pronounced failure, but his other dramas were of considerable merit and were successfully staged. The most noteworthy of these were: 'Ostergade og Vestergade' and 'Capriciosa.' He also published 'Den danske Skueplads i dens Historie fra dens Bagyndelse til vor Tid' (History of the Danish Theatre, 7 vols. 1854-76). His original comedies were published in 5 vols. (1851-2).

**O'vêrstone, Samuel Jones Loyd**, BARON, English financier: b. London, England, 25 Sept. 1796; d. there 17 Nov. 1883. He was graduated from Cambridge in 1818, entered his father's banking-house and became its head before its consolidation with the London and Westminster Bank. He was member of Parliament for Hythe in 1819-26 and became a recognized authority on questions of finance. He strenuously opposed the introduction of limited liability and of the decimal system, but did not engage in politics after 1833, when he was defeated as candidate to Parliament for Manchester. He was the author of many valuable tracts on questions of finance, and the Bank Act of 1844 was directly due to the influence of his writings. In 1850 he was created Baron Overstone and Fotheringhay.

**O'vert**, in law, evident, undisguised; an overt act signifies an act which may be clearly proved, and was manifestly intended.

**O'verton, Gwendolen**, American novelist: b. Fort Hays, Kan., 19 Feb. 1876. She was educated in Paris and Switzerland and has published 'The Heritage of Unrest' (1901).

**Overton, John Henry**, English Anglican clergyman: b. Louth, Lincolnshire, 4 Jan. 1835. He was educated at Oxford, took orders in the English Church, and was curate of Quedgely 1858-60; vicar of Leghbourne 1860-83; rector of Epworth 1883-99; and rector of Gumley from 1898. He has been canon of Lincoln Cathedral since 1879 and was Birbeck lecturer on ecclesiastical history at Trinity College, Cambridge, 1902-3. He has published 'The English Church in the 18th Century' with C. J. Abbey; 'William Law: Non-juror and Mystic'; 'Life in the English Church 1660-1714'; 'Life of Christopher Wordsworth: Bishop of Lincoln'; 'Evangelical Revival in the 18th Century'; 'John Wesley'; 'The English Church in the 19th Century 1880-1833'; 'The Anglican Revival'; etc.

**Overton, Richard**, a British pamphleteer flourishing in the first half of the 17th century, probably from about 1630-65. He spent part of his early life in Holland, but upon his return about the time when the Long Parliament opened commenced publishing anonymous attacks on the bishops. He next turned to theology and wrote a tract on 'Man's Mortality' which excited much comment, and soon following the publication of this tract a small sect arose known as "Soul Sleepers," who adopted a modified form of his doctrines as portrayed in this tract. This was suppressed by the House of Commons and Overton branded a heretic. He then began a violent attack on the clergy in a series of pamphlets for which he was arrested, but his authorship could not be proven and the charge against him dropped. In 1646 he became involved with Lieut.-Col. Lilburne in his case against the lords and was imprisoned, but after a year of confinement was released. His imprisonment had not diminished his democratic zeal, for he at once took up with the London levellers and was one of those who presented to Fairfax the 'Plea for Common Right and Freedom.' On 28 March 1649 he was again arrested and sent to the Tower, and even while there managed to issue a 'Defiance' to the Government, but through lack of sufficient evidence he was released on 8 November. In 1655 he became implicated in the projected uprising of the levellers, fled to France, obtained a commission from Charles II., and some months later returned to England to bring about an insurrection. Of his later history little is known except that he was imprisoned in December 1659 and again on 22 Oct. 1663 probably for attacks on the government of Charles II. The most important of his numerous works are: 'New Lambeth Fair Newly Consecrated, etc.' (1642); 'Articles of High Treason Exhibited Against Cheap-side Cross' (1642); 'Man's Mortality' (1643); 'The Arraignment of Mr. Persecution' (1645); 'An Alarum to the House of Lords' (1646); 'The Outcries of the Oppressed Commons' (1647); 'A Picture of the Council of State' (1649); 'Overton's Defiance

of Act of Pardon' (1649); 'The Baiting of the Great Bull of Basham' (1649); etc.

**O'verture**, in music, an introductory symphony, chiefly used to precede great musical compositions, as oratorios and operas. The Germans have composed overtures for poetical works, as Beethoven's overture to Goethe's *Egmont*. Overtures are often played independently of the work for which they were written, as at the beginning of concerts; but their highest office is to convey to the intelligent lover of music the whole character of the following piece or to concentrate its chief musical ideas so as to give a sort of outline of it in instrumental music. The latter mode of composing overtures was first conceived by the French, and such is the character of the overtures of their great composers, among whom may be classed Cherubini. Carl Maria von Weber, in the overtures to the 'Freischütz' and 'Oberon,' in which the general character of the following piece is given, has observed this rule, which did not exist when Mozart composed his admirable overtures to 'Figaro' and 'Don Juan.' In the oldest overtures the fugue was the chief part, preceded by a *grave* and closing in the dominant. Another form came into vogue at a later period—three musical parts, in different movements—an *allegro*, an *andante*, and again an *allegro* or *presto*, were united. At present the most usual form is a brilliant and passionate *allegro*, preceded by a short, solemn passage. See also **PRELUDE**.

**Ovid, Publius Ovidius Naso**, Roman poet: b. Sulmo (Sulmona), high among the Apennines, almost due east of Rome, 20 March 43 B.C.; d. Tomi (Kustendje), on the Black Sea, south of the mouth of the Danube, 17 or 18 A.D. His family belonged to the class of wealthy landowners, and he and his brother, who died, however, in early manhood, were educated, as was usual, for an official career. In the short sketch of his life given in 'Tristia,' IV., 10, he tells us that, despite his best efforts, all that he wrote took metrical form, and although, to please his father, he preserved and actually filled several minor offices, poetry soon claimed him for her own. Twice married and soon divorced, he took as his third wife a lady of the great Fabian house, who remained faithful to him in his exile, though neither she nor his daughter shared it with him. His own gifted and winning personality, coupled with an ungrudging admiration of the genius of others, won for him the friendship of all the poets of his time, especially of Propertius, and of Tibullus whose untimely death he laments in one of his few poems of true pathos ('Amores,' III., 9). With the poet Æmilii Macer, Vergil's friend, he spent more than a year abroad, visiting Athens, the famous coast towns of Asia Minor, and especially Sicily, by whose beautiful scenery and legendary associations he was completely captivated. His works show the influence of his travels, though most of the material is supplied by his multifarious reading.

During the reign of Augustus Rome became for the first time a really imperial city, and the external splendor of the capital was matched by the distinction of its fashionable society. All the arts of life were called into play to lend a finer polish and a keener zest to social inter-

course. Wit and good manners took the place of religion and morality. Of this gay and cultivated society, with its worship of the senses, its cynical worldly wisdom and its love of brilliant rhetoric, Ovid is a typical member. In the first period of his literary activity he treats almost exclusively of love, regarded always as desire, never, at least on the part of the man, as devotion. To this time belong: (1) 'Amores,' in three books, poems for the most part associated with a certain Corinna. (2) 'Heroides,' 21 letters sent by women of the Heroic Age to their husbands or lovers. The fifteenth, certainly, and probably the last six also are by some clever imitator of Ovid. (3) 'De Medicamine Faciei,' on the beautifying of the face. (4) 'Ars Amatoria,' in three books, regarded by Macaulay as Ovid's greatest and most characteristic work. "Perhaps the most immoral poem ever written." (5) 'Remedia Amoris,' a companion to the 'Ars,' but in no way comparable with it. He wrote also a tragedy, 'Medea,' much praised by ancient critics, which has not come down to us.

About the beginning of the Christian era he undertook the composition of two works of far wider scope and somewhat different character, the 'Metamorphoses' and the 'Fasti.' The first of these, in 15 books, is deservedly his best known work. The stories of the Greek mythology, involving an amazing variety of transformations from primeval chaos to the change of Julius Cæsar into a star, are retold with inimitable grace and liveliness, and most ingeniously linked together, like the tales of 'The Arabian Nights,' into an unbroken series. The book has had an immense influence upon modern literature, and was a storehouse of subjects for the painters of the Renaissance. The 'Fasti,' originally in 12 books, of which, however, the last 6 were never completed and published, is an account of the astronomical phenomena and the Roman festivals of the first 6 months of the year. The inquiry into the origin of the feasts and their ceremonies gives occasion for some entertaining stories from Roman mythology and early history.

Ovid was still engaged upon these works when, toward the end of the year 8 A.D., an imperial edict ordered him to leave Rome on a specified day and proceed to Tomi, on the desolate shores of the Euxine. His books were excluded from the three public libraries of Rome, and, while his property was not confiscated, no hope of recall was held out. The reason for his banishment is still a mystery. In the poems of exile, Ovid repeatedly ascribes his fate to two causes, his poetry (*carmen*) especially the 'Ars Amatoria,' and a "mistake" (*error*) not "guilt" (*scelus*), for which his eyes were responsible. But he steadily refuses to state the nature of this *error*, on the ground that he is unwilling to pain Augustus a second time. The 'Art of Love,' which had been published nearly ten years before, while it may well have been the ultimate cause, could hardly have been the actual occasion of the edict, and it has been thought not improbable that he was involved in the intrigue of the younger Julia, the Emperor's granddaughter, with Silanus, a scandal which was coincident with Ovid's ruin. He wrote at Tomi 'Ibis,' a learned invective against an enemy at Rome, and a fragment of a poem on fish, 'Halieutica,' also eulogies of Augustus and Ti-

berius which have not come down to us. The loss of the poem on Augustus is especially to be regretted, as it was written in the native Getic dialect. But the two important productions of these melancholy years are the five books of 'Tristia' and the four books of 'Epistulæ ex Ponto.' These elegies are addressed to his wife, to his friends, to Augustus, and give expression to the poignant sorrows of his present lot and his passionate longing for home. Boissier calls his appeals to Augustus a "delire d'adulation." But it was all in vain, and he died a few years after the accession of Tiberius, broken-hearted, though much beloved by the people of Tomi.

Ovid's work is characterized by remarkable smoothness and variety of expression, by the liveliest fancy, and a positive genius for graphic description, but he wrote with too great facility to learn the lesson of self-restraint. With the exception of the 'Metamorphoses' and the 'Halieutica' which are written in hexameters, all his poetry is cast in the form of the elegiac distich, and this he brought to such perfection that the Ovidian couplet became the model for all modern work in this measure.

**Bibliography.**—The best text is that of Merkel, revised by Ehwald (Leipsic 1880-94). The 'Amores' were translated into English verse by Christopher Marlowe and (in part) by Dryden, the 'Ars Amatoria' (in part) by Congreve and by Dryden, the 'Heroides' (in part) by Dryden, Book I. of the 'Tristia' by Arden (New York 1821). Garth gathered into one volume (1st ed. London 1810) versions of the 'Metamorphoses' by various hands, Dryden, Addison, Congreve, Pope, Rowe, Gay and others, including himself. Consult: Nageotte, 'Ovide, sa vie, ses œuvres' (Dijon 1872); Sellar, 'Horace and the Elegiac Poets' (Oxford 1892); Boissier, 'L'Opposition sous les Césars' (Paris 1892).

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**Oviedo**, ò-vè-á'fhô, Spain, (1) a town in the Asturias, capital of a province of the same name, 230 miles northwest of Madrid. It is walled, and has clean but irregular streets. The Gothic cathedral, university, and other educational establishments, court-house and hospital are the chief buildings. In 1809 Oviedo was given up to pillage for three days by Ney. Pop. (1900) 48,374. (2) The province, area 4,091 square miles, is situated on the Bay of Biscay, and bounded by the provinces of Santander, Leon, and Lugo. It has a wild and stormy coast, and a mountainous interior better adapted for pasture than agriculture. Great numbers of cattle, goats, and swine are raised; linens, woollens, leather, etc., are manufactured, and coal is exported.

**Oviedo**, Juan Antonio, South American clergyman: b. New Granada 25 June 1670; d. Mexico City 2 April 1757. He was graduated from the University of Guatemala and shortly afterward became professor of philosophy there; then for some time taught philosophy in Mexico and theology in Guatemala; became procurator at Rome and Madrid; then was appointed rector of Mexico and was twice provincial of the Jesuits of Mexico. His writings are mainly historico-religious dealing mostly with the ecclesiastical history of Mexico and California. The most important are: 'Vida y virtudes heroicas del Apostólico y Ven. P.

Antonio Nuñez' (Mexico 1702); 'Menologio de los Varones ilustres en Santidao de la Provincia de la Compañia de Jesus de la Neuva España' (1727); 'Vida admirable del Ven. P. José Vidal' (1753); 'Vida y afanes Apostólicos de las Californias' (1753); 'El Apostol Mariano: Vida del Ven. P. Juan Maria Salvatierra de la Compañia de Jesus Conquistado espiritual de las Californias' (1754); 'Elogios de muchos Hermanos Coadjutores de la Compañia de Jesus que han florecido en las Cuatro partes del Numar' (2 vols. 1755); 'Vide y Virtudes del P. Pedro Speciali Jesuita de la Provincia de Mexico' (1727); etc.

**Oviedo y Valdez**, è vâl-dâth', **Gonzalo Fernandez de**, Spanish historian: b. Madrid 1478; d. Valladolid 1557. In 1513 he received a government appointment in the newly discovered Island of Hispaniola, and with few intervals spent the rest of his life there. As governor of the mines in the island his conduct was cruel to the Indians, and many perished under his barbarous treatment. Named by Charles V. historiographer of the Indies, he wrote his 'Sumario de la Historia General y Natural de las Indias Occidentales' (1535 et seq.). He wrote also 'Quinquagenas,' so entitled from its consisting of 50 dialogues, in which the author is the chief interlocutor.

**Ovipositor**, an organ developed in relation to the orifice of the genital ducts of female insects, whose normal function is to place the fertilized egg in a position most suitable to its proper development. When typically developed the ovipositor consists of three pairs of stiff or membranous unjointed styles or gonopophyses, of which the anterior or lowermost closely ensheathes the other two. The three pairs together form a tube into the base of which the oviduct opens and along which the eggs are conducted to the situation selected for their deposition. The homology of these styles is not fully settled, but the generally accepted and best supported view is that they represent the embryonic appendages of the seventh, eighth and ninth abdominal segments, from which they are directly developed in at least some cases. In the entire orders of *Lepidoptera*, *Coleoptera* and *Diptera*, as well as in many representatives of other orders, no true ovipositor is developed. In such cases the terminal segments of the abdomen may form a retractile and protractile tube serving as an egg-conductor. The *Orthoptera*, *Odonata*, *Hymenoptera* and *Hemiptera* exhibit the organ in its highest state of development, and variously modified to meet various conditions. In the locusts it has the form of a stout sickle-blade, permanently exserted, and efficient in splitting plant tissues for the reception of the eggs. The sawflies have the margin of the outer sheath serrated for cutting slits into leaves, etc., while the cicadas completely shatter twigs by the power of their ovipositors. Some of the ichneumon flies (q.v.) have ovipositors remarkably adapted to their parasitic habits; in the long-tailed ichneumon-fly, for example, the organ is filamentous and so long and powerful that it is capable of penetrating the solid wood of tree trunks to a depth of several inches, reaching and depositing eggs within the burrows of woodborers on which the ichneumon-fly larvæ subsist.

The most remarkable of all modifications of the ovipositor, however, is found among the ants, bees, and wasps, in most of which it becomes a most efficient and beautifully constructed poisoning apparatus or sting, which consequently is possessed by the females alone. The sting, like other ovipositors, consists of three pairs of styles, but the middle pair are united into a single barbed piece grooved on the ventral side, and partly ensheathing the inner pair of very acute piercing darts. The outer pair form a protecting sheath to the sting proper. Within the abdomen is a tubular venom gland, with a reservoir and duct opening into the base of the grooved piece. When in operation the latter and the two darts work alternately in and out, penetrating deeper and deeper into the wound into which they conduct the venom. The male genital armature of insects is derived from essentially the same embryonic parts as the ovipositor and sting of the female, but never reaches the same structural complexity and serves solely as a clasping organ during copulation. Consult Packard, 'Text-book of Entomology' (1898).

**O'vis**, a genus of the family *Bovidae* and subfamily *Ovinae*, including the sheep (q.v.).

**O'vule**, an outgrowth of the carpel of a plant where, by fertilization with pollen, a seed is formed. The ovules are always enclosed in the cavity of the ovary, or seed-producing organ. They are developed as a rule from the margin of the carpels, but several exceptional modes of development exist. See SEED.

**O'vum**, an egg. See EMBRYOLOGY; EGG.

**Owatonna**, ô-wâ-tôn'na, Minn., city, county-seat of Steel County; on the Straight River, and on the Chicago & N., the Burlington, C. R. & N., and the Chicago, M. & St. P. R.R.'s; about 65 miles south of Saint Paul. It was settled in 1855 and incorporated in 1865. It is in an agricultural region in which corn, wheat, and nursery stock are important products. The chief manufactures are dairy products, flour, foundry and machine-shop products, soap, butter tubs, churns, automobiles, carriages, seeders, engines, and fanning mills. The prominent buildings are the court-house, opera-house, city hospital, the church and school buildings. There are three parks, four steel bridges, and a large number of fine residences. The educational institutions are the State School for Dependent and Neglected Children, the Pillsbury Academy, Sacred Heart Academy, public and parish schools, and a public library which contains about 7,000 volumes. The government is vested in a mayor who holds office one year and a council. The city owns the waterworks. Pop. (1890) 3,849; (1900) 5,561; (1910) 5,658.

**Owego**, ô-wê'gô, N. Y., village, county-seat of Tioga County; on the Susquehanna River at the mouth of the Owego Creek, and on the Delaware, L. & W., the Lehigh Valley, and the Erie R.R.'s; about 30 miles east of Elmira and 20 miles west of Binghamton. It was settled in 1785 by James and Robert McMasters and others. It was chartered as a village in 1827. An Indian village, on the site of the present Owego, was destroyed in 1779. It is in

a farming section, but has considerable manufacturing interests. The steel bridge works have about 150 employees; the mica works, 75; the leather glove factory, 35; the wagon works, 150; cigar factory, 40; saddlery, 50; silk glove factory, 150; piano factory, 15; and other manufacturing industries employ about 100 more persons. Owego has considerable trade in lumber, farm products, and its own manufactures. The educational institutions are the Owego Free Academy, union and graded schools, one parish school, and the Coburn Free Library. There are seven churches. The three banks have a capital of \$200,000; the annual business amounts to \$800,000. The government is vested in a president and six trustees; three of the trustees are chosen each year by popular vote. There is a colored population of about 10 per cent of the whole. Pop. (1910) 4,633.

L. W. KINGMAN,  
Editor 'Owego Gazette.'

**Owen, d'ën, David Dale**, American geologist: b. New Lanark, Scotland, 24 June 1807; d. New Harmony, Ind., 13 Nov. 1860. He was educated at Hofwyl, Switzerland, and in 1823 accompanied his father to the United States and assisted him in his socialistic undertaking at New Harmony. He made a special study of geology and natural science and his investigations took him over a large portion of Indiana and Iowa. He made a government geological survey of Iowa, Wisconsin, and Minnesota, beginning in 1848 and in 1852-7 was engaged in a geological survey of Kentucky. He was appointed State geologist of Kansas in 1857. Among his publications are reports of his surveys of Indiana and Arkansas (1858-60).

**Owen, John**, English non-conformist clergyman: b. Stadham, Oxfordshire, England, 1616; d. Ealing, Middlesex, England, 24 Aug. 1683. He was educated at Oxford and early espoused the parliamentary cause in the civil war. In 1642-6 he was pastor at Fordham, Essex, and in the latter year took charge of a Presbyterian congregation at Coggeswall, Essex, and there introduced independent church government. He was appointed private chaplain to Cromwell in 1649 and in 1651 was dean of Christ Church, Oxford, where he was vice-chancellor of the university in 1652-7. Losing favor with Cromwell, he was removed from his office as dean in 1660 and though offered a parish in Boston, Mass., in 1663 and the presidency of Harvard College in 1670 declined both and lived in retirement, devoting much time to literary work. His most notable work was an 'Exposition of the Epistle to the Hebrews' (1668-84). His collected works were published in Edinburgh in 1850-5 and in Philadelphia in 1865-9. Consult 'Life' by W. Orme (1820).

**Owen, Mary Alicia**, American author: b. Saint Joseph, Mo., 29 Jan. 1858. She was educated at Vassar College and turned her attention to the study of Indian lore; her discoveries in Voodoo magic are important and she has been admitted to tribal membership with the Indians and to their secret societies. She has also made a study of the gypsies, and has published: 'Voodoo Tales'; 'Oracles and Witches'; etc.

**Owen, Sir Richard**, English naturalist: b. Lancaster 20 July 1804; d. Richmond Park 18 Dec. 1892. He studied at the University of Edinburgh, began practice in London as a surgeon in 1826, became lecturer in comparative anatomy at St. Bartholomew's hospital in 1829, later was conservator of the Hunterian Museum of the Royal College of Surgeons until 1856, and in 1836-56 was first Hunterian professor of comparative anatomy and physiology. In 1838 he received the Wollaston gold medal of the Geological Society, and in 1840 became the first president of the Microscopical Society. From 1856 to 1883 he was superintendent of the natural history collections of the British Museum. In 1887 he obtained the removal of these collections from the Museum and their establishment at South Kensington as a museum of natural history. He was the first Rede lecturer at Cambridge in 1859, and received numerous foreign distinctions including the decorations of many orders and the Cuvier prize (1857). In 1857 he assisted David Livingstone (q.v.) in the preparation of the latter's 'Missionary Travels and Researches in South Africa,' and in 1861 published an edition of the posthumous papers of John Hunter. Among the more important of his own works were 'Odontography' (1840-5); 'Lectures on the Comparative Anatomy and Physiology of Invertebrates' (1843); 'History of British Fossil Mammals and Birds' (1846); 'On the Anatomy of Invertebrates' (1866-8); 'Researches on Fossil Remains of Extinct Mammals of Australia' (1877-8), and 'Memoirs on Extinct Wingless Birds of New Zealand' (1879). By 1856 he had won recognition as the leading anatomist of his time. His scientific labors were extensive and continuous, and he was an active and often bitter controversialist. He was with Cuvier a pioneer in vertebrate palæontology, and made to the study many important contributions, including prominently a paper on 'Archæopteryx' (1863). His discoveries also were numerous, and he was among the first to work toward a concise nomenclature in anatomy. Consult 'Life' by his grandson (1894).

**Owen, Robert**, English social theorist: b. Newtown, Montgomeryshire, North Wales, 14 May 1771; d. there 17 Nov. 1858. He established a small cotton-spinning works at Manchester, and later became known as a successful manager of large mills. In 1794-5 he organized the Chorlton Twist company, which operated the new Lanark mills, and in 1814 a new company was established. This included the names of William Allen, Joseph Fox, Jeremy Bentham, and other noted philanthropists and reformers, and was organized on the principle "that all profits beyond 5 per cent per annum on the capital invested shall be laid aside for the religious, educational and moral improvement of the workers and of the community at large." The employment of children was stopped, a new system of education established, the houses improved and insurance funds established; and the community of New Lanark became noted for the prosperity of its people. In 1813 Owen published 'New Views of Society, or Essays upon the Formation of Human Character,' and in



## OWEN — OWENS LAKE

1826-44 a 'Book of the New Moral World,' in which he advanced and developed his socialistic views, insisting upon an absolute equality among men. In 1817, he presented a report to a Parliamentary committee on the causes of poverty and means of avoiding it. In 1829 he gave up the management of the Lanark Mills, and devoted his time and entire fortune to the propagation of his socialist doctrines. He set up two social communities on his own plan, one at Orbiston in Lanarkshire, another at New Harmony, Ind. They proved signal failures. In his later years he became a believer in Spiritualism. He is regarded as one of the founders of English socialism; many of his followers were active in the Chartist movement (q.v.). See Jones, 'Life, Times, and Labors of Robert Owen' (1890); Holyoke, 'Life and Last Days of Robert Owen' (1871); and Owen's incomplete autobiography (1857-8).

**Owen, Robert Dale**, American social reformer; b. Glasgow, Scotland, 9 Nov. 1801; d. Lake George 17 June 1877. He came to the United States in 1825 with Robert Owen (q.v.). In 1826 he received from Fanny Wright 860 acres of unimproved land at Nashoba, near Memphis, Tenn., for the purpose of establishing under white direction a settlement of liberated negroes. This scheme failed. In 1827 he established at New York with Fanny Wright 'The Free Inquirer,' a socialistic and agnostic publication. In 1832 he returned to Indiana, where in 1835 he was elected to the legislature as a Democrat. He was chosen to Congress in 1843 and 1845. A measure concerning the Oregon boundary, introduced by him in 1844, became the basis of the settlement of 1846. He was prominent in the founding of the Smithsonian Institution (1845) and in the remodeling of the Indiana constitution (1850). In 1853 he was made *chargé d'affaires* at Naples, in 1855 minister. After his return (1859) he was active as an abolitionist. He was, at least in later days, a firm believer in Spiritualism, and in this connection were written some of his most interesting works, such as, 'Footprints on the Boundary of Another World' (1859), and 'Debatable Land between this World and the Next' (1872). Others of his writings are: 'The Personality of God and the Authority of the Bible' (1832), and 'Pocahontas: A Drama' (1837); 'Threading My Way' (1874), an autobiography covering the first 27 years of his career.

**Owen, Robert Latham**, U. S. senator from Oklahoma, 1907-13; Democrat; C. Lynchburg, Va., Feb. 6, 1856. Senator Owen began his career as a teacher in the Cherokee Orphan Asylum, but studied law and began practice in 1880. From 1881 to 1884 he was Secretary of the board of education of the Cherokee Nation; and was owner and editor of the 'Indian Chieftain' in 1884, and U. S. Indian Agent for the First Civilized Tribes, in 1885 to 1889. He organized the First National Bank of Muskogee, and was its president from 1890 to 1900, being also interested in banking, farming and cattle. He recovered from the U. S. Government nearly \$9,000,000 for Choctaws, Chicasaws and Cherokees. He was a member of the Democratic National Committee from 1892 to 1896.

**Owen Meredith**. See **LYTTON, EDWARD ROBERT**.

**Owen Sound**, Canada, town and county-seat of Gray County, Ontario, a port of entry at the mouth of Sydenham River, and at the head of its estuary called Owen Sound, an outlet on Georgian Bay, Lake Huron. It is a terminal of branches of the Grand Trunk and Canadian Pacific Railways; 100 miles northwest of Toronto, has one of the best harbors on the lakes, a large trade in grain and lumber, and steamboat communication with all the principal lake ports. It has manufactures of agricultural and mill machinery, sewing machines, and furniture, and lumber and flour mills, and large grain elevators. A United States consular agent is resident.

**Owens, ð'ēnz, John Edward**, American actor; b. Liverpool, England, 4 May 1824; d. near Towson, Md., 6 Dec. 1886. He made his first appearance as an actor in Philadelphia in 1841. In 1849 he was manager of the Baltimore Museum and in 1852 opened Brougham's Lyceum in New York; later, manager of the Charles Street Theatre in Baltimore and afterward starred successfully for several seasons. In 1864-5 he played at Wallack's Theatre, New York, in 'Solon Shingle,' and in London. He starred in various stock companies and in 1882-3 made his last engagement in New York at Madison Square Theatre in 'Esmeralda.'

**Owens College**, Manchester, England, was established under the will of John Owens, a Manchester merchant, who died July 1846, and left about \$500,000 for the purpose of founding an institution for providing or aiding the means of instructing youths over 14 years of age, in such branches of learning and science as are now or may be hereafter taught in the English universities, subject to the immutable condition that no student, professor, etc., shall be required to make any declaration or submit to any test of their religious opinions, and that theological and religious subjects shall form no part of the teaching of the college. From 1851 to 1873 the college occupied a private house, when it removed to a handsome Gothic building erected by public subscription. The success of the college led to a proposition, which received considerable ecclesiastical opposition, to incorporate a university, with several affiliated colleges located in different towns, but having its seat in Manchester. In 1880 Victoria University was instituted by royal charter, with power to grant degrees in arts, sciences, and law, a supplemental charter, granted May 1883, giving power to grant degrees in medicine. Owens College is thus the central college of the University. University College, Liverpool, was incorporated with Victoria University in 1884, and the Yorkshire College, Leeds, in 1888. A women's college, under the direction of the professors of Owens College, is also affiliated, and Victoria University grants degrees or certificates to women.

**Owens Lake**, a lake in Inyo County, southeastern California, east of Mount Whitney of the Sierra Nevada, 18 miles long and 10 miles wide. It receives the waters of the Owens River (q.v.), but has no visible outlet, and its waters are very salt.

## OWENS RIVER—OWLS

**Owens River**, a river of southeastern California, rises in the southern part of Mono County, flows southeast and then south, and empties into Owens Lake (q.v.); length 175 miles. Its course is through a desert valley with the Sierra Nevadas on the west and the Inyo Mountains on the east; its volume of water is considerably diminished during the summer season, some of its branches drying up entirely. A branch of the Southern Pacific Railroad parallels it for the greater part of its course.

**Owensboro**, ô'enz-bûr-ô, Ky., city, county-seat of Daviess County; on the Ohio River, and on the Illinois Central, the Louisville & N., and the Louisville, H. & S. L. R.R.'s; about 41 miles southeast of Evansville, Ind. It has steamer connections with all the principal river ports. It is in a farming and stock raising region, and near are forests, coal and oil fields. In the vicinity are deposits of iron, lead, zinc, and fire clay, and stone quarries are nearby. The chief manufactures are tobacco products, cellulose, wagons, carriages, whiskey, brandy, brick and tile, and iron products. It has an extensive trade in tobacco products, coal, farm products, live-stock, and manufactures. The prominent public buildings are a government building, county court-house, jail, and the high school. Its educational institutions are the Owensboro Female College (1890), Saint Francis Academy, public and parish schools. The mayor holds office four years. The waterworks and electric-light plant are owned and operated by the city. Pop. (1910) 16,011.

**Owl Parrot.** See KAKAPO.

**Owlet Moths**, a section of the family *Noctuidæ*, containing small species. The *Noctuidæ* is an immense assemblage of night-flying moths made up of hundreds of genera and thousands of species, and represented in all parts of the world. They are as a rule of less than medium size and of dusky tints, and are closely allied to the tiger-moths (*Arctiidae*), from which they may be distinguished by the subcostal nervure of the hind wing anastomosing with the radial only near the base of the cell. In the fore wing the fourth and fifth radial nervures fork from the third which is connected by a cross-nervure with the second. The frenulum is present and the first maxillæ are well developed. The caterpillars are not hairy as a rule, and ten prolegs are usually present. The pupa is sometimes naked and subterranean, lying within a rude cell of clay; sometimes enclosed in a cocoon made partly of leaves, etc., on the surface of the ground.

**Owls**, nocturnal birds of prey of the group *Striges*. The owls form a compact clearly circumscribed group solidified by many common characters, but the question of their relationship to other birds is one which ornithologists have found most puzzling. Formerly they were united without question with the other birds-of-prey, but the raptorial bill and claws, in which the resemblance to the hawks is most striking, may well be only adaptations to similar predaceous habits. On the other hand it is equally probable that the soft plumage, highly developed sense-organs, etc., are adaptations to nocturnal activity; certainly they are least developed in the more diurnal species. As a result of more fundamental anatomical studies a strong tide of opinion has set in toward a belief

in a relationship of the owls to the night-jars (*Caprimulgidæ*) and the peculiar oil-bird (*Steatornis*), with which they are often united, but as a distinct suborder (*Striges*), in the order *Coraciiformes*, but many ornithologists refuse to follow this current. The very characteristic physiognomy of the owls results chiefly from the development about the eyes of areas of radiating feathers, or facial disks, supported by a ruff of peculiar stiff recurved feathers. Frequently the head is ornamented by paired tufts of longer, erectile feathers called horns or ears, though they have nothing whatever to do with the sense of hearing, but are comparable to the crests found on the heads of many birds. The general plumage is very soft and fluffy, making noiseless flight possible and giving an exaggerated idea of bulk. The feathers have no aftershaft; and some species, like the snowy owl, have the feet and toes thickly feathered to the claws, giving them a peculiar booted appearance. The head is always remarkably large, and the bill strongly hooked and cered. A peculiarity of the large, strongly clawed feet is the versatility of the outer toe, which may be directed forward, outward or completely backward and paired with the hallux at will. In correlation with their keen senses the sense-organs are greatly developed. The great staring eyes look directly forward, and, owing to their form, can rotate but slightly in their sockets, a peculiarity which explains the owl's habit of following with the head any object at which its gaze is directed. The somewhat cylindrical or truncated conical form of the eye results from the great development of the bony sclerotic or focusing ring. Unlike most birds the upper, and not the lower, lid is chiefly employed in closing the eye, which is further protected by a conspicuous nictitating membrane. Although many differences in the degree of its development are presented, owls are almost the only birds which may be said to have an external ear approaching that of mammals. It is of course concealed beneath the feathers, but, when best developed as in the short-eared owl, covers the entire side of the head, and is provided with a prominent marginal fold of skin or "operculum." In this case the openings are asymmetrical, one being directed upward, the other downward, and in the great gray owl and its immediate allies even the skull bones are asymmetrical. By common consent the barn owls are separated from all of the others as a family (*Strigidæ*) or subfamily. They have the furculum complete and ankylated with the sternum, and the latter with an entire posterior margin. The remaining owls (*Bubonidæ*) have the furculum free from the sternum and either very thin or incomplete in the middle, and the posterior border of the sternum notched. Not less than 50 genera and 250 species of owls, varying in size from a sparrow nearly to a small eagle, have been described, and many exhibit several color-phases. The group is absolutely cosmopolitan.

Owing to their nocturnal habits, their ways are less well known than those of most birds, but in general are much the same. With the notable exception of such species as the snowy owl and hawk-owl, they seek concealment during the day in dark retreats, but become active after nightfall. Their prey consists of snails, insects, mice, birds, rabbits or even larger animals, according to the size of the species, which they

approach on noiseless wing and usually grasp with one foot, after which it is borne away to a perch and torn to pieces. A few species feed on fishes, and one even on crabs, but never on vegetable matter. Undigested portions, as bones, hair and hard parts of insects are ejected in pellets from the mouth. Their voices present some variety; some hoot, some whistle, but the cry of many resembles a shrill laugh. Owls breed very early, many of them in late winter, and deposit their nearly spherical, white or whitish, eggs in holes in trees or rocks, in nests deserted by other birds or rudely constructed by themselves on the ground or in trees. One species, the American burrowing owl, nests in communities in or among the burrows of prairie dogs, but the association does not partake of the happy relation sometimes described. The young are interesting objects, thickly covered with down, usually white.

The mystery surrounding their nocturnal habits and their often lugubrious cries have made owls suitable objects of superstition among all peoples and in all ages. Among the ancients the owl was regarded on the one hand as a portent of dire calamity and its appearance near a sick chamber an omen of death; on the other, it was the bird of wisdom, the symbol of the goddess Athene. Both attributes naturally arose from a knowledge of the owl's keen senses, which, exaggerated in the popular imagination, enabled it to perceive knowledge beyond the common reach, and even to scent the putrescent effluvia of approaching death in the beginning of an illness. How deeply fixed and widely spread is the belief in the owl as an evil omen is shown by the frequency of its occurrence in all literatures and folk-lore. The Hindus have an interesting myth of the crow (night) and the owl (moon) contending for supremacy. Among the American Indians the owl figures in many legends. One told in the Kootenay tribe is to the effect that the wicked owl was in the habit of carrying off crying children. Through trickery it was finally killed and its body burned by the coyote, but its spirit rose from the ashes as a swarm of blood-sucking mosquitoes.

For an account of the numerous species of owls of the United States consult Baird, Brewer and Ridgway, 'North American Land Birds' (1874); Barrows, 'Standard Natural History' (1885); Sharpe, 'Catalogue of Striges of the British Museum' (1875); and for ancient and mediæval superstitions to Gubernatis, 'Zoological Mythology' (1872).

See the names of various species as BARN OWL, HAWK-OWL, etc. J. PERCY MOORE,  
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**Ownership** is the dominion of a thing real or personal, which one has the right to enjoy and to do with as he pleases, even to spoil or destroy it as far as law permits, except that he is prevented by some agreement or covenant restraining such right. An owner continues to have the same right although performing no acts of ownership, and although another may perform such acts without his knowledge or against his will; but an owner may lose his right in a thing if he permit it to remain in the possession of a third person for sufficient time

to enable the latter to acquire a title thereto. Any thing or property may be the subject of a joint ownership by two or more persons having an equal right to it. Ownership as applied to one's title to property is the right by which a thing belongs to a particular person to the exclusion of all others. The foundation of ownership is possession, but it is not sufficient as against one who can show a better right.

**Owosso**, ô-wôs'ô, Mich., city in Shiawassee County; on the Shiawassee River, and on the Grand Trunk, Michigan C., and Ann Arbor R.R.'s; about 80 miles west by north of Detroit and 30 miles north by east of Lansing. It was settled in 1836 by A. L. and B. O. Williams and Elia Comstock, and chartered as a city in 1859. It is in a farming region and has considerable manufacturing interest. The chief industrial establishments are furniture factories, which have about 650 employees; casket factory, 150 employees; screen door and window factory, 200; car shops, 150; sugar works, 75; miscellaneous, about 55. The prominent public buildings are the churches and schools. It has Oakside school, a business college, and a ladies' library. There are eight churches. The three banks have a combined capital of \$300,000. The charter of 1895 provides for a mayor, who holds office one year, and a council of 10 members. The water-works are owned and operated by the municipality. Pop. (1910) 9,639.

G. I. CAMPBELL,  
Editor 'The Evening Argus.'

**Ox**, a bovine animal; that is, a ruminant of the sub-family *Bovina*, which includes the typical species of the large family *Bovida* (q.v.); more specifically, a male of some domesticated breed of Europe or America, or their dependencies, the female of which is called a "cow," the young a "calf" (or when one to two years old, a "heifer"), and a herd collectively "cattle." Hence, by extension, all the *Bovina* are spoken of as cattle, wild or tame, a list of which follows. The group is characterized by its large size and bulky form, and by various minor characteristics, of which the foremost is the roundness, smoothness, horizontal up-curving growth and comparative shortness of the horns. Like the other sections of the family, antelopes, sheep, goats, etc., oxen are easily recognized but rather difficult to define technically. The history of the group begins, so far as known, in the Lower Pliocene (Siwalik) formations of India. The oxen apparently originated in that part of the world and reached Europe and North America in the time represented by the Upper Pliocene rocks. In some of the earlier species the females seem to have been hornless; but the type quickly assumed its proper form, and some of those fossil in the Siwalik beds are closely related to our modern domesticated cattle. Europe possessed in the Pleistocene, or period just preceding the Glacial Period, a widespread, gigantic long-horned species named *Bos primigenius*, and another species (*B. brachycerus*) with much shorter horns. Both seem to have survived the Glacial Period in sufficient strength to reoccupy the continent after the recession of the ice; and

they constituted the great forest oxen, which Cæsar found in his campaigns in Gaul and Germany, and to which, not distinguishing them, he gave the general name *urus*. Some survived as late, at least, as the reign of Charlemagne, and from them were derived, no doubt, the modern domesticated races of the Western World, possibly with some small and later admixture of native Eastern species. These cattle were tall, strong, and seem to have differed mainly in the comparative length and shape of the horns; and there seems no doubt that a remnant of *Bos primigenius*, nearly, or, as some believe, quite pure, exists in the white cattle preserved in the Chillingham estates in the north of England (see CHILLINGHAM WHITE CATTLE); it is also regarded as certain that the Holstein breed is a direct descendant of this species. The other (short-horned) species has long been extinct, but was apparently the progenitor of the great body of European domestic cattle, whence have been derived the herds of America, South Africa, Australia, and, in fact, all the world except the Orient.

The domestication of cattle began in prehistoric times; and some Asiatic species now extinct may have supplied the stock represented as in the service of the civilized nations of ancient Persia, Asia Minor, Syria, and Egypt by the early carvings and paintings which have come down to us, but they may have been derived from one or both of the species above mentioned. They were carried to Carthage and westward and to southern Europe when the civilizations of Greece and the Italian peninsula arose, and some were no doubt gradually taken by Roman settlers into western Europe as fast as it was subjugated, where they would be crossed with the larger, hardier short-horned local races of Gaul. Apparently the native cattle of the British Isles were of the long-horned (*B. primigenius*) stock only; but when what now is England was conquered and colonized by the Romans and later by the Saxons, Normans, etc., the better short-horned cattle which they brought with them were substituted first in the south of England and gradually elsewhere, replacing the British long-horns everywhere except in the extreme north, where the red Highland cattle perhaps represent them to this day. The Friesian and Holstein breeds of the Netherlands, and the semi-wild Spanish cattle are regarded also as nearly direct descendants of these aboriginal long-horned oxen, and from the Spanish stock, transported to South and Central America in the 16th century, came the vast plains-ranging herds of the Argentine pampas, Mexico, Texas and neighboring States. It was not until comparatively recent times that care and improved methods of breeding began to develop in England, northern France and the Netherlands the improved breeds now so distinct and valuable for beef or for milking. Most of the early cattle brought to eastern North America seem to have been of the short-horned English variety; and these, keeping pace with European development by intelligent selection, and the frequent importation of foreign sires of high quality, and mingled with the western "scrub" cattle, have produced the excellent varieties now to be seen in the United States and Canada.

Nearest to our domestic cattle are two East Indian species, the gaur and the gayal (qq.v.), which are domesticated to some extent by the people west of the Bay of Bengal. Closely related is the banting (q.v.) of Sumatra. The common humped or Brahman cattle (see ZEBU) of India and eastward represent a distinct species, of which no wild herds remain, and which has been bred into many distinct varieties, of which one of the most aberrant is the Abyssinian sanga. The yak (q.v.) of Tibet, and the diminutive forest-ox (see ANOA) of Celebes, bring the list of oxen down to the buffalos. Of these (see BUFFALO) the East Indian species still exists in wild bands in the jungles of India and the Malayan Peninsula, but has been domesticated for a very long period, and is used as a beast of draft and of burden throughout southeastern Asia, and in many parts of tropical Africa. Africa has two native species, neither in domestication. A fourth species inhabits Mindanao, one of the Philippine Islands. The bisons (q.v.), composed of the American bison and the aurochs, neither of which have been domesticated to any practical extent, although both are extinct except in small protected herds, complete the list of the bovine animals of the world.

Consult standard zoologies, especially the writings of Blanford upon the mammals of India, Persia and Abyssinia; Lydekker, 'Oxen, Sheep and Goats of the World' (1898); and the authors cited under BISON, BUFFALO, etc.

ERNEST INGERSOLL.

**Ox-bird, or Ox-eye.** See DUNLIN.

**Ox-bot, a bot-fly attacking meat cattle; a warble-fly.** The well-known ox-bot or breezefly of Europe is *Hypoderma bovis*, and until about 1890 it was believed by naturalists that the very similar flies prevalent in North America were the same, but it is now known that they belong to a second species (*H. lineata*) locally known in the southwestern United States as heel-fly. The larvæ or warbles are called "grubs" by American stock-raisers, and affected cattle are said to be "grubby." These and various allied species parasitic upon domestic and wild animals, and even upon humanity in certain tropical regions, constitute the family *Æstridae*. In the case of the American ox-bot (*H. lineata*) the flies appear early in spring and haunt feeding cattle, hovering especially about their legs, where they deposit their eggs mainly upon the hairs overhanging the hoofs. The egg is barely visible to the unaided eye, is cigar-shaped, and has one end formed into a clasping appendage by which it is attached to the hair. Five or six are placed in a close row on each hair. The cattle lick themselves and gather these eggs upon the tongue, where they hatch, and the maggots make their way into the gullet, where they catch on the walls, force their way through by means of the sharp spines about the head, and nest in the wall-tissues of the throat until they have undergone a molt. They remain here many weeks, then make their way to the skin of the neck and work along beneath it to the back, where during winter the presence is shown by the swelling of the hide over them. These grubs are nourished by the pus and serum produced about them by their movements. Some weeks later, or toward spring, the maggots reach maturity, molt again, become nearly an inch long, and at last force their way out through the skin; they then drop

## OX-EYE — OXALIC ACID

to the ground, the larval skin dries and stiffens, and the maggot within separates itself from this old integument and turns into a pupa stage, which is speedily completed, allowing the fly to emerge in time to produce a brood before the end of the summer. The knowledge of this life-history was gained only as recently as 1890, mainly through the investigations of Dr. Cooper Curtice; and it is not yet known whether the eggs and young of *H. bovis* pass through a similar series of events.

The damage done by ox-bots is very great, and is due to the perforation of hides by the escape of the maggots; loss of milk and beef due to the fretting and often stampeding of the cattle when the flies are laying their eggs; and general depreciation of the stock. The insect is so uncommon that it may be disregarded east of the Alleghenies; but it is exceedingly numerous and troublesome in the Mississippi Valley and South-western States, and the cattle there, especially in Texas, betray the greatest terror in the fly season, rushing headlong when a fly appears, and if possible dashing into the water and staying there. In addition to the harm to beef and milk caused by the nervousness, exhaustion and interference thus produced, one half of the hides that reach market from the infested regions show perforation by warbles, and suffer a discount in price which on the average will amount to a third of the value of perfect hides.

Consult: Howard, 'The Insect Book' (1901); Osborn, 'Insects Affecting Domestic Animals' (U. S. Dept. Agriculture, 1896); Brauer, 'Monographie der Estriden' (1863).

**Ox-eye**, a popular name for several composite plants, especially of the American genus. In America the name is most widely applied to *Heliopsis*, about ten species of which are distributed from Nova Scotia to Florida and westward to the Mississippi Valley. They are, with one exception, all perennials which bear abundant yellow flowers in the fall, but are not so popular in gardens as members of the genus *Helianthus*, the sunflowers. The ox-eyes of Europe are species of *Buphthalmum*, which are sometimes grown in America in hardy borders. They have large flower-heads with long yellow ray-florets, and resemble sunflowers. Being showy and of simplest culture they are worthy a place in gardens. In the New England States the name is given to the black-eyed susan (*Rudbeckia hirta*), and to the ox-eye daisy (*Chrysanthemum leucanthemum*). See DAISY.

**Ox-gall**, the bile of the ox, a greenish bitter fluid secreted by the liver of the animal. After being clarified it is suitable for various uses in manufactures and the arts, especially in the mixing of colors for water-color painting, its effect being both to increase their fluidity and to fix them. It is also used in medicine, either in concentrated mass or powdered after drying, as a stimulant to the flow of bile and as compensation for the lack of the secretion of bile. It is further useful in the form of enemas.

**Ox-pecker.** See BUFFALO-BIRD.

**Ox-warble.** See OX-BOT.

**Oxalic Acid**, a dibasic organic acid whose salts occur in various plants, and which takes its name from the occurrence of the acid potassium salt in common sorrel (*Oxalis acetosella*). Oxalic acid may be obtained by heating sawdust

with a mixture of caustic soda and caustic potash. The immediate product is oxalate of soda, which may be obtained in granular form by exhausting the mass with boiling water, and evaporating the filtrate. To prepare the acid in the free state, the sodium oxalate is boiled with milk of lime, and the calcium salt so obtained is decomposed with sulphuric acid. Much of the commercial supply of oxalic acid, however, is obtained by the oxidation of sugar with nitric acid. Anhydrous oxalic acid may be obtained in the form of octahedral crystals, by allowing a solution of oxalic acid in sulphuric acid to stand for some days. The anhydrous acid has the formula  $\text{COOH}.\text{COOH}$ , or  $\text{H}_2\text{C}_2\text{O}_4$ , melts at  $369^\circ \text{F}$ ., and absorbs water from the air, its crystals then falling into powder. The oxalic acid of commerce contains two molecules of water, crystallizes in the monoclinic system, and is readily soluble in water and in alcohol. The hydrated crystals give off their water of crystallization when heated to  $212^\circ \text{F}$ . or when allowed to stand for some weeks over concentrated sulphuric acid. The hydrated crystals bear a close resemblance to Epsom salts, with which oxalic acid is sometimes confounded, with fatal results. Heated to about  $300^\circ \text{F}$ ., oxalic acid decomposes with the formation of carbon monoxide, carbon dioxide, water, and formic acid; a small quantity of oxalic acid also subliming at the same time, without change. When heated with concentrated sulphuric acid, it breaks up into water, carbon monoxide, and carbon dioxide, the latter two gases being given off in equal volumes. Oxalic acid forms two series of definite, crystallizable salts, according as one or both of its typical hydrogen atoms are replaced. The neutral oxalate of ammonia is used, in the laboratory, as a reagent for the detection of lime, since it gives, with a salt of calcium, an insoluble, white precipitate of calcium oxalate. Neutral oxalate of potassium reacts with ferrous sulphate to form a double oxalate of iron and potassium, which possesses powerful reducing properties, and is used as a photographic developer. The acid oxalate of potassium (also known as salt of lemon, or salt of sorrel), is used for different purposes in the arts. Oxalic acid itself is used in calico-printing, and also in various bleaching processes, especially the bleaching of straw.

**Poisoning by Oxalic Acid.**—So commonly is oxalic acid used to polish kitchen boilers, etc. and to remove ink and fruit stains, that it is frequently mistaken for a "harmless powder." There is reason to believe that poisoning sometimes results from the frequent use of some cheap effervescent drinks in which citric acid is adulterated with oxalic acid. Oxalic acid is ranked as a corrosive poison, though, if taken in dilute solution, there may be no evidence of corrosion. The symptoms of this poisoning are heat and severe pain in the mouth, throat, and stomach, difficulty in swallowing, a sense of constriction, vomiting—perhaps of blood—muscular cramps, sometimes convulsions, and purging, in some cases attended with blood. The lips, mouth, and throat are at first red and swollen, then white. If the poisoning is severe the pulse is small and thready, there is a cold, clammy perspiration, then collapse, and, it may be, death from inanition. For treatment, first neutralize the poison by giving milk of lime, with a large

excess of hydrated lime, chalk, whitening, marble-dust, or even whitewash from the wall, if it can be obtained; then give a purgative dose of castor-oil, allay pain, and give stimulants if signs of collapse be present. Emetics are rarely needed and any liquid other than milk of lime should be sparingly used, if at all.

**Ox'alis**, a genus of herbs and shrubs of the natural order *Geranaceae*. The species, of which there are about 200, are mostly natives of the warm parts of South America and Africa, but some are well known weeds, called wood-sorrel, in the north temperate zone; many have tuberous or bulbous roots. The genus is generally characterized by digitate or ternate compound, clover-like leaves which "sleep" at night or in very cloudy weather, that is, the leaflets assume a resting position at such times. The flowers generally close under similar conditions. The seeds, which are contained in a capsular fruit, are thrown to considerable distances when the fruit bursts open. The best known American species is the common wood-sorrel (*O. acetosella*). It is also a native of Europe and western Asia. Naturally it grows best in shady places and is often found covering the ground as thickly as grass, its little white, rosy-veined flowers appearing in abundance throughout the season. Probably the next best known is the violet wood-sorrel (*O. violacea*), a native of the eastern United States. It inhabits similar localities but has pinkish violet flowers.

**Oxalu'ria**, a morbid condition of the system, in which a prominent symptom is the presence of crystallized oxalate of lime in the urine. See URINE.

**Oxenbridge, John**, English colonial divine in America: b. Daventry, Northamptonshire, 30 Jan. 1608; d. Boston, Mass., 28 Dec. 1674. He was educated at Cambridge and Oxford, preached for a time in England and later in the Bermudas, whither he made two voyages, held a curacy at Beverley, was pastor of a church at Berwick-on-Tweed, held a fellowship at Eton from 1652 until ejected at the Restoration (1660), and as a preacher was driven from the exercise of his office by the act of uniformity. In 1669 he came to New England and on 4 May 1670 was ordained pastor of the first church at Boston. Among his works are: 'A Double Watchword' (1661); 'A Sermon at the Anniversary Election of Governor' (1672).

**Oxenford, öks'förd**, John, English dramatist and critic: b. Camberwell, London, 12 Aug. 1812; d. London, 21 Feb. 1877. He was educated for the law and admitted to the bar in 1833, but chose a literary career. He translated from the German several notable works, among them Goethe's 'Autobiography.' For 30 years preceding his death he was dramatic critic on the *London Times*. Among his plays are: 'My Fellow Clerk' (1835); 'The Two Orphans'; 'Twice Killed' (1835); 'A Day Well Spent.'

**Oxenham, öks'sen-am, John**, English novelist. He was educated at Victoria University, Manchester, and was for some time resident in this country. Returning to England he gave up commercial pursuits and turned to literature. He has published 'God's Prisoner' (1898); 'Rising Fortunes' (1899); 'A Princess of Vascovy' (1900); 'Our Lady of Deliverance' (1901); 'A Modern Masquer' (1901); 'John of

Gerisau' (1902); 'Under the Iron Flail' (1902); 'Bondman Free'; 'Mr. Joseph Scorer'; 'Barbe of Grand Bayou' (1903); 'A Weaver of Webs'; 'Hearts in Exile' (1904); 'The Gate of the Desert'; 'White Fire' (1905); etc.

**Oxenstierna, öks'ën-shär-nä, Axel**, COUNT, Swedish statesman: b. Fanö 16 June 1583; d. Stockholm 28 Aug. 1654. He studied theology and later law at Rostock, Wittenberg, and Jena; at 20 entered the diplomatic service of Charles IX.; was his minister to Mecklenburg in 1606; entered the senate in 1609; was head of the regency during the last days of Charles IX. and through the minority of Gustavus Adolphus; became chancellor of the realm in 1612; acted as regent during the prolonged absence of the king; effected the Peace of Stolbova with Russia (1617); and in 1626 was made governor-general of Prussia. After the death of Gustavus Adolphus at Lützen in 1632, Oxenstierna received almost unlimited powers, directed the league against Austria, and held it together for four years. He returned to Sweden in 1636 and became the leading spirit in the regency of Christina, using all efforts to bring about peace with Germany. The Peace of Brömsebro, concluded in 1645 as the result of negotiations undertaken by his son John, the Swedish plenipotentiary to Germany, was highly displeasing to the Queen. His obstinate opposition to Christina's plan of naming her own successor widened the breach between them, and he gradually withdrew from public affairs.

**Oxford, öks'förd**, England, a celebrated university city, the capital of Oxfordshire, 54 miles n.w. of London (63½ miles by rail), is situated on a low-lying bank at the confluence of the rivers Thames (locally called Isis) and Cherwell. The rivers are crossed by several bridges, the principal of which are Magdalen Bridge, over the Cherwell, and Folly Bridge, over the Isis. In early times the city was surrounded by a wall, a portion of which still exists, intact, in New College Gardens. The castle of Oxford, famous for the Empress Matilda's escape over the frozen Thames in 1141, has disappeared, but the keep, built in the time of Rufus, remains entire, and is included in the precincts of the prison. The principal street, colloquially "The High," has a length of about 1,000 yards, and its greatest width is 85 feet. It is adorned by several of the noblest structures of the city, including Brasenose, All Souls', University, Queen's, and Magdalen Colleges, Saint Mary's (the University Church), the New Examination schools, together with quaint old houses. The botanic gardens, dating from the 17th century, add to the beauty of the street.

**Educational Institutions.**—The most interesting buildings are the colleges, component parts of the University of Oxford (see OXFORD, UNIVERSITY OF), but separate corporations, possessing property apart from the university. The buildings of the university proper are situated mainly between Broad and High streets. The most remarkable is the Bodleian Library, founded by Humphrey, Duke of Gloucester, built between 1444 and 1480, and restored by Sir Thomas Bodley about 1610. South of the Bodleian is the beautiful Radcliffe Camera (or Camera Bodleiana) erected 1737-49 to contain the books presented by Dr. Radcliffe to the university, but now used as a reading room for the



**Bodleian.** A new building for the Radcliffe Library has been erected in the precincts of the Museum by the munificence of the Drapers' Company of London. North of the Bodleian stands the Clarendon Buildings, built from the proceeds of Clarendon's 'History of the Great Rebellion.' It was until 1830 the home of the Clarendon Press, but is now utilized for the various University offices. Westward of the library is the Sheldonian Theatre, designed by Wren, and presented by Archbishop Sheldon, a large semi-circular chamber capable of seating 4,000 persons, and used by the university for the conferment of degrees, and other public functions. The university also possesses the New Examination Schools, the Taylor Institution, with the University Galleries and Ashmolean Museum; the Science Museum, the large University Parks with the beautiful walk known as Mesopotamia, the Indian Institute, and the Botanic Gardens. New laboratories and a new building for the Radcliffe Library have been erected in close proximity to the Science Museum. The New Schools are used for university lectures as well as for examination purposes.

The most remarkable of the various college buildings is Christ Church. The great quadrangle (Tom Quad) is the largest in Oxford, the gateway was begun by Cardinal Wolsey, completed from designs by Wren, and contains the famous bell known as "Great Tom." Christ Church is also remarkable for its magnificent dining-hall and staircase, and its library. The Cathedral, situated in the college precincts, fulfills also the function of a College chapel. Not less interesting is Merton College, with its ancient chapel and the "Mob Quad," the earliest quadrangle in Oxford. New College, a perpendicular building of the late 14th century, is due to the munificence and to the architectural skill of the great prelate, William of Wykeham. Its chapel, cloister, and gardens are among the sights of Oxford, and its large quadrangle remains, except for the addition of a third story, much as it appeared to the founder's eye. Magdalen College is famous for its exquisite tower, its chapel and cloisters, and the water walks, known as Addison's Walk. The buildings of All Souls' College are also rich in architectural association, and every college has some feature of peculiar interest. The chapel and garden buildings of Saint John's, the library of Corpus Christi, Dr. Johnson's rooms at Pembroke, and the general effect of the quadrangles of Corpus, Oriel, Wadham, Balliol, and University are illustrations of this. Modern additions to the architecture of Oxford have not been uniformly fortunate, but the latest additions to Brasenose and New College and the Examination Schools are worthy of the traditions of the university. Several of the colleges, notably Worcester, Saint John's, Wadham, Merton, New College, and Trinity, have also beautiful gardens, and Christ Church possesses the famous Broad Walk in the Meadow. There are several colleges for women, the most important of which are Somerville College, Lady Margaret Hall, Saint Hilda's Hall, and Saint Hugh's Hall. Mansfield College (perhaps the most successful piece of recent building in Oxford), intended for the education of men for the Nonconformist ministry, was established in 1889; and buildings were opened in 1893 for Manchester College, removed from London in 1889.

**Libraries.**—The Public Libraries Act was adopted in 1852 and a library opened two years later. The present building, forming part of the new Town Hall, was opened in 1895, and contains lending and reference departments, general ladies' newspaper rooms, and a children's reading room and library. The library contains altogether about 25,000 volumes. Special features are a large collection of local books, and a Braille library for blind students of the University.

**Public Buildings and Charitable Institutions.**—Notable buildings not connected with the university are the New Municipal Buildings, containing the Town Hall, Public Library, Police Station and Court, and the various city offices, the Corn Exchange, numerous schools, the Radcliffe Infirmary, the Warneford Lunatic Asylum on Headington Hill, the Martyrs' Memorial, the Pusey Memorial House, with its Chapel of the Resurrection; and the New Theatre.

**Churches.**—Oxford is the see of a bishop. Christ Church, the cathedral church of the diocese, originally belonged to the priory of Saint Frideswide. Besides being the cathedral church of the diocese it is also the college chapel, but is of greater antiquity than the college, having been built in the 12th century. Saint Mary-the-Virgin, the University Church, finely situated nearly in the centre of the High street, is conspicuous by its richly decorated tower, terminating in a beautiful spire 189 feet high. It ranks as one of the finest Gothic structures in Oxford. The church of Saint Martin's or Carfax was removed in 1896 to afford more room at the crossing of the four great thoroughfares, High street, Queen street, Cornmarket, and Saint Aldate's. The ancient tower has been preserved. All Saints' Church is a Queen Anne building in the classic style, of which it is an excellent example. Saint Mary Magdalen presents several beautiful features, and has acquired much additional interest from the Martyrs' Aisle, added as a fit accompaniment to the Martyrs' Memorial, which stands close to it, near the spot where Ridley, Latimer, and Cranmer suffered martyrdom. The most important of the other ecclesiastical edifices in Oxford are the churches of Saint Aldate, Saint Giles, Saint Peter in the East, Saint Thomas, Saint Barnabas, and the Roman Catholic Church of Saint Aloysius. Saint Peter in the East is very ancient, and possesses Saxon as well as Norman work; it has a large crypt. Several handsome churches have been recently erected, Saint Philip and Saint James' and Saint Margaret's in the north; Saint Matthew's in the south, and Saint Mary and Saint John's in the east, the last served by the Cowley Fathers, an active Anglican brotherhood. The city contains also places of worship for Methodists, Congregationalists, Baptists, Brethren, and other nonconformist bodies. During the 19th century the city has been encircled by extensive residential suburbs. Less than two miles from Oxford stands, close to the river, the Norman church of Iffley, one of the most perfect pieces of Norman architecture in England.

**Public Works, Government, etc.**—The prosperity of the city depends mostly on the university, but a considerable trade is carried on in grain, and a cattle market is held twice a month. The city is governed by a Council, consisting of a Mayor, 15 Aldermen, and 45 councillors, of

## OXFORD — OXFORD MOVEMENT

whom 3 Aldermen and 9 councillors are elected by the university. It returns one member to Parliament. Since 1892 the city has been lighted by electricity, it has a modern drainage system, and an excellent water supply. Pop. (1906 during term, estimated), 53,000.

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**Oxford, Miss.,** city, county-seat of Lafayette County; on the Illinois Central railroad; 70 miles southwest of Corinth. It was built in 1836, but was burned during the Civil War. It is in a cotton-growing region, and has a cotton-gin and mill, and a cotton compress, also a planing mill, canning factory, and grist mill. It has two public graded schools, one for the colored race; it is also the seat of the State University of Mississippi, and of the Woman's College (M. E., 1854). Pop. (1910) 2,014.

**Oxford, N. C.,** town, county-seat of Granville County; on a northern branch of the Tar River, and on the Southern railroad, 35 miles north of Raleigh. It is in a fertile tobacco-growing region, has a large trade in tobacco, and contains several tobacco warehouses and manufacturing, also a saw-mill, furniture factory, and an iron foundry. It has two orphan asylums, one for colored children, the other under the charge of the Masonic fraternity. It has no public high school, but is the seat of the Horner Military School (non-sectarian) and of the Oxford Female Seminary (Baptist, 1850), with secondary and collegiate departments. Pop. (1910) 3,018.

**Oxford, Ohio,** village in Butler County; on the Cincinnati, Hamilton & Dayton railroad; about 35 miles north by west of Cincinnati. It is in an agricultural region and its chief indus-

tries are connected with farm products. It is noted as an educational centre; it is the seat of Miami University (q.v.), Oxford College (q.v.), and Western College (q.v.). Pop. (1890) 1,922; (1900) 2,009; (1910 est.) 2,200.

**Oxford Clay,** in geology, a term used by English geologists of the lower division of the Middle Oolitic (see OOLITE), making up with calcareous sandstones the Oxford (or Middle) Oolitic group, and so corresponding to one of the upper sections of the Jurassic. It is a blackish, brownish, or dark blue clay, rich in fossil ammonites and belemnites.

**Oxford College,** a college for women established in 1849 at Oxford, Ohio. Besides the regular collegiate work, there are courses in music and art, and provision for post-graduate work; there is also a preparatory department. The collegiate work is arranged in three courses, classical, literary, and scientific, leading to the degrees of A.B., B.L., and B.S. There are about 150 students and 17 instructors.

**Oxford Movement,** a religious movement in the Church of England which originated among certain members of Oxford University. Its aim was the revival of religious life and doctrine in England on a purer and more primitive basis. The Church of England in the early part of the 19th century was in a condition in which reform was sorely needed. The fervid spirit of John Wesley and his successors had kept the spark of spiritual life still glowing in the heart of the masses, and the Roman Catholic Church as a consequence of Catholic Emancipation was rehabilitating itself. There were two main parties in the Church of England. There was the great Evangelical party who "whether they were admired as Evangelicals, or abused as Calvinists, or laughed at as Saints, were inheritors not of Anglican traditions, but of those which had grown up among the zealous clergymen and laymen who had sympathized with the great Methodist revival and whose theology and life had been profoundly affected by it." This party numbered many men of power among its ranks who kept alive the spirit of such pious and earnest leaders as Hervey, Romaine, Cecil, Venn, Fletcher, Newton, and Thomas Scott. They trusted less in ordinances, or in ecclesiastical rites and traditions, than in the stirrings of the individual soul toward God, private study of the Scriptures, and constant prayer.

In contradistinction to these Low Churchmen were the old-fashioned High Churchmen who had existed in the Established Church since the time of Laud. They clung to the learning of such theology as had become the heritage of the Church through the teaching of a line of solid divines from Hooker to Waterland. Bishop Wilson of Sodor and Man in his 'Sacra Privata' was their model of practical and personal devotion, but they also drew for their religious life upon the stores of Andrewes, Jeremy Taylor, and Ken. They preached calm scholarly sermons, which embodied a gospel of common sense; but did not appeal to the heart of the middle or lower classes. Besides these two great parties there was rising in the Church a spirit of free thought which should afterward develop into the Broad Church party of Stanley and Jowett. Connop Thirlwall and Julius Hare

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had become strongly tinged by the influence of recent German critical speculation and Whately, Hawkins and Milman were looking for a wider field of religious life and conviction which should be bounded neither by the conventionalities of the Evangelicals, nor the somewhat frigid dignity and strictness of the High Church party.

The two chief leaders in the movement which was to bring a new life into the English Church were men of the very highest gifts—John Keble and John Henry Newman. There were two sides to the spirit of this movement; one was theological, the other moral. As illustrating these two aspects of religious life it is impossible not to cite the 'Christian Year' which appeared in 1827 and embodied the essence of 'Tractarian' theology while it was warmed by the most pure and exalted ethical, if not ascetic, temper and tendency. When Newman began his ministry his sermons were remarkable for this same practical tone and his 'Holiness Necessary for Future Blessedness' was preached in 1826, before he was appointed vicar of Saint Mary's and struck the keynote of all his subsequent pulpit utterances. It was this intense moral earnestness that gave power and impetus to the new movement.

The political condition of England had much to do with the origin of the Oxford movement. The Reform Bill had just been passed and it looked as if the government were about to invade the rights of the Church. It was at this time that a sermon of Keble's seemed to fire the train. "On 14th July 1833," we read in Cardinal Newman's 'Apologia,' "Mr. Keble preached the assize sermon in the University Pulpit. It was published under the title of 'National Apostacy'. I have ever considered and kept the day as the start of the religious movement of 1833." The speaker described England as "a nation which had for centuries acknowledged as an essential part of its theory of government, that, as a Christian nation, she is also a part of Christ's Church, and bound, in all her legislation and policy, by the fundamental laws of that Church." He proceeds to charge the nation with now disavowing this principle, a course which implies "a direct disavowal of the sovereignty of God. If it be true anywhere that such enactments are forced upon the legislature by public opinion, is Apostacy too hard a word to describe the temper of such a nation?"

The effect of Keble's sermon was to cause a meeting at Mr. Hugh James Rose's parsonage at Hadleigh, Suffolk, between the 25th and 29th of the same July. Next in authority to Rose as leader in the movement (after Keble, Newman and Pusey) was William Palmer, and he has himself described the feelings with which the "Conspirators," as they were styled, met on that occasion. "We felt ourselves assailed by enemies from without and foes within. Our prelates—insulted and threatened by Ministers of State. . . . In Ireland—ten bishoprics suppressed. What was to come next? . . . We were overwhelmed with pamphlets on Church Reform. Lord Henley, brother-in-law of Sir Robert Peel, Dr. Burton, and others of name and influence led the way. Dr. Arnold of Rugby ventured to propose that all sects should be united by Act of Parliament with the Church

of England. Reports were prevalent that some of the prelates were favorable to alterations in the Liturgy. Pamphlets were in wide circulation recommending the abolition of the creeds (at least in public reading) . . . the removal of all mention of the Blessed Trinity; of the doctrine of baptismal regeneration; of the practice of absolution." The party pondered over what was the best means of opening the eyes of Churchmen, and it was resolved at Hadleigh that this could only be done by writing, by publishing certain declarations, certain manifestoes, and thus to carry out the spirit of Keble's sermon. In this way were born what Mozley afterward called "that portentous birth of Time" 'The Tracts for the Times.'

The first Tract appeared 9 Sept. 1833. It was written by Newman. He wrote, as he says, under the conviction "that ancient religion had well nigh faded out of the land through the political changes of the last 150 years, and it must be restored." In the introduction he asserted the doctrine of Apostolic succession, and the ministerial power to give absolution. The early Tracts produced a profound sensation. They wakened men's minds, and in many quarters the cry was raised that they contained "Romanism" in disguise; yet they quoted the Prayer Book, and the most authoritative English divines and even bishops were puzzled how to regard them. They were supplemented by the 'Churchman's Manual' which explained the nature and claims of the Church and its Ministers. In the course of 1845 the party was joined by Edward Bouverie Pusey (q.v.) and he early contributed an elaborate tract on 'Fasting.' Between 1835 and 1840 the "Tractarians," as the promoters of the Oxford movement were called, had swollen to the dimensions of a large party. As a protest against its so called Romanizing tendency a monument was erected in Oxford to the martyrs of the Reformation Cranmer, Ridley and Latimer, but the "Memorial" had little effect in arresting the progress of the movement which was on its way to win the coming generation of English clergy to maintain the doctrines of Apostolic Succession, Baptismal regeneration, Priestly absolution, the real Presence in the Eucharist, and the Divine Character of the Church. But in a short time the authorities both of Oxford University and of the Church of England became alarmed. The Bishop of Chester, J. Bird Sumner, was the first to condemn the movement by denouncing in 1838 "the undermining of the Protestant Church by men who dwell within her walls . . . who sit in the Reformers' seat and traduce the Reformation." Yet the Tractarians undoubtedly made mistakes and showed impatience, exaggeration and little consideration for the scruples of those who did not accept their teachings. When the tract was published entitled 'On reserve in communicating Religious knowledge' they ventured on dangerous ground, and touched on topics not relevant to their main crusade, laying themselves open to the charge of avowing the principle of keeping back part of the counsel of God. But the formation of a "Romanizing" section in Tractarian party was not justifiably charged against them until the publication of Tract 90 in which Newman attempted to show that the 39 Articles of the Church of England could be so inter-

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preted as to harmonize with the teaching of the Roman Catholic Church. This was the turning point in the history of the movement. The Tractarian doctrine was condemned by the Heads of Houses at Oxford. The bishop of Oxford forbade the publication of such views, and Newman yielded. The Tractarian candidate for the professorship of poetry, a man of undoubted genius, was defeated, and Mr. Ward, another Tractarian, dismissed from his mathematical lectureship at Balliol, and the climax was reached when Pusey was accused and found guilty of preaching doctrine contrary to that of the Church of England and was suspended from preaching within the University for two years. Finally a movement was set on foot to procure a vote of censure on Ward's 'The Ideal of a Christian Church' in which the Roman Catholic Church was set forth as that ideal, and the English Church condemned as not fulfilling it. The motion was passed by a majority of 58 members of the Convocation, and only failed of being ratified by the Vice-Chancellor through the interposition of a legal technicality. On 3 Oct. 1845 Newman requested the Provost of Oriel to remove his name from the books of the College and University, and on the 8th completed his 'Essay on the Development of Christian Doctrine'; two days afterward he was received into the Roman Catholic Church.

Newman was not the only one to leave the Church of England. A host followed him: Oakley, fellow of Balliol, Collins of Saint Mary the Virgin's, Oxford; the poet F. W. Faber, rector of Elton; Gordon of Christ Church, Regents Park. By December, 1846, 150 clergymen and laity of the Church of England had entered the Roman Catholic Church.

Consult: Church, 'The Oxford Movement'; Newman, 'Apologia'; 'Letters of John Henry Newman'; Palmer, 'Narrative of Events Connected with the Publication of Tracts for the Times'; Mozley, 'Reminiscences.'

**Oxford University**, England, at Oxford (q.v.), its foundation, by tradition, ascribed to Alfred the Great, who had a mint in the city, is believed to have its authentic origin in the quarrel between Henry II. and Becket, when the king, about 1164, directed an ordinance against the partisans of Becket, to the effect that all clerks possessing revenues in England and resident in Paris had to return in three months "as they loved their revenues." Philip II. of France was aiding Becket, and Henry forbade English clerks to study at Paris. Just after this edict the schools of Oxford became very flourishing, and assumed the character of the contemporaneous university; the existence of Doctors of various faculties as well as of Masters and Scholars being recorded about 1187 in connection with the celebrated visit of Giraldus Cambrensis. The earliest public document known to exist which applies the title of university (*universitas*) to the schools of Oxford is one which dates from 1201. In 1214 the Bishop of Lincoln, the ecclesiastical superior of the monks gathered within his diocese, appointed a chancellor for their government, and the constitution which arose out of such elements has been moulded into its present form in part by the authority of the Crown and of Parliament, in part by the inherent self-governing power of the

university itself. The first chancellor known to have been appointed was Robert Grossteste, about 1224, who was afterwards Bishop of Lincoln. Other authorities represent that its first charter was that granted to it by Elizabeth in 1570, when it was enacted that henceforth the University should be known by the name of "The Chancellor, Masters and Scholars of the University of Oxford," and by no other name, upon which its privileges depended until the passing of the Oxford University Act of 1854. The elective franchise was conferred upon the university in 1604, since which time it has returned two members to Parliament.

The collegiate system at Oxford dates from the 13th century. At first the students who congregated at the university had no special places of abode provided for them, but had to find accommodation for themselves. As the students found it cheaper to unite and rent a single house in which they might live together than to provide each for himself, they frequently did so, forming halls, hostels, or inns. Sometimes, for the sake of giving greater facilities to study, sums of money would be given or bequeathed to the university for the erection of buildings in which the students might live without any more expense than was necessary for their maintenance. The first who went further than this was William of Durham, who, dying in 1249, bequeathed a sum of money to the university to provide a permanent endowment for the maintenance of a certain number of "masters." The first purchase was made in 1253, and with this purchase originated University College. There were two other colleges founded during the same century—Balliol College, in 1263, and Merton College, founded at Maldon in Surrey in 1264, and removed to Oxford before 1274. This last college is said to have been the first in which the collegiate system in its modern form, or a form resembling the modern one, was instituted, the college being made a separate corporation, with a separate charter and separate statutes. The first statutes of University College as a separate corporation are dated 1280. At the beginning of the 14th century, while there were no more colleges than the three just mentioned, there were about 300 halls. As the number of colleges increased, and their growing endowments attracted greater numbers of students, the halls declined in numbers, especially since the attendance of students diminished in the centuries following the 14th. At the beginning of the 16th century the number of colleges had increased to 10, while that of the halls had declined to 55. There are now 21 colleges, all of which are separate corporations, and, with two exceptions, have endowments for fellows and scholars. At Christ Church the fellows are distinctively called "students" (ordinary students being, of course, called undergraduates). All Souls' College has no scholars or undergraduates, except a small number of "Bible-clerks," and Keble College has no fellows. The fellows and scholars at Oxford hold pretty much the same position as at Cambridge (see CAMBRIDGE, UNIVERSITY OF, and FELLOWSHIP). Besides the colleges, there is one public hall, St. Edmund Hall. It is not a separate corporation, and has no endowments for fellows, and it will be united to Queen's College on the occurrence of the next vacancy in the principalship, as St. Mary Hall

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has been incorporated with Oriel. The following are the names of the colleges in the order of their reputed foundation: University, Balliol, Merton, Exeter (founded 1314), Oriel (1326), Queen's (1340), New College (1379), Lincoln (1427), All Souls' (1437), Magdalen (1458), Brasenose (1509), Corpus Christi (1516), Christ Church (1546), Trinity (1554), St. John's (1555), Jesus (1571), Wadham (1612), Pembroke (1624), Worcester (1714), Hertford, and Keble. The two last-mentioned date from last century. Hertford is the restoration of an old foundation, while Keble (which is a "new foundation" and not a college in the strict sense) was founded in 1870 for the education solely of members of the Church of England; it enjoys the privileges (except as regards the academical status of its head) which are possessed by other colleges in the university. There are also three private halls, governed by "licensed masters"; and since 1884 one college and four halls for women have been established, Somerville College and Lady Margaret, Saint Hugh's and Saint Hilda's halls. Women cannot become members of the University or take degrees, but are admitted to the University examinations, and the names of those who pass or take honors are officially published. The largest of the colleges is Christ Church, established in 1546 by Henry VIII., from funds collected by Cardinal Wolsey; it is commonly known as "the House" (*Ædes Christi*). In the 15th century an enactment was passed requiring all students who joined the university to become members of some college or hall, and this condition continued to be the law until 1868, when persons were permitted under certain conditions, to enjoy the privileges of the university without so doing, keeping their statutable residence in approved houses or lodging in the town. Those who avail themselves of this permission are called "non-collegiate students." They are exempt from the heavy expenses inseparable from living in college rooms and pay small tutorial fees.

The constitution of the university is fixed by the act of 1854, which modifies that granted by the act of Elizabeth. The style or title by which the corporation is known is The Chancellor, Masters, and Scholars of the University of Oxford. Legislation in university matters has to be prepared by the Hebdomadal Council, and pass through two bodies, the Congregation of the University and Convocation. There is also another body, the Ancient House of Congregation, made up of the *necessario regentes* and *regentes ad placitum*, whose functions are confined to ratifying the nomination of examiners and to the granting of ordinary degrees. The House of Convocation consists of all who have been admitted to the degree of Master of Arts, provided their names have been constantly kept on the books of some college or hall, or of the delegates of non-collegiate students, and in the last resort Convocation has supreme control over the action of the university. Congregation consists of all Masters and Doctors resident in Oxford and most matters are settled by it, appeals to the superior body of Convocation against a decision of Congregation being rare. The Hebdomadal Council consists of certain official and certain members elected by Congregation. The official members are the chancellor, the vice-chancellor, and the two proctors. The elected members are:

six heads of colleges or halls, six professors, and six members of Convocation of not less than five years' standing. The members of Convocation elected may be either heads of houses or professors. The election takes place once in three years. The elected members hold office for six years, and half of them are chosen on every occasion. They meet every Monday in term time (whence the name of the body), and when convoked by the vice-chancellor. All legislative measures originate with them; but most of the ordinary business of the university is transacted by boards of delegates or curators elected or appointed *ad hoc*.

The principal officers of the university are the chancellor, the high steward, the vice-chancellor, the two proctors, the public orator, the keeper of the archives, and the registrar. The dignities of chancellor and high steward are almost purely honorary, and are usually conferred on noblemen. The vice-chancellor, who is nominated by the chancellor from the heads of colleges, and chosen in the order of their election as heads, holds office for four years, and is now, in fact, the supreme executive and judicial authority of the university. The principal duty of the proctors is to maintain the discipline of the university, but they also serve *ex officio* on most of the university boards and delegacies.

There are about 100 professorships, lectureships, and readerships in the University of Oxford, besides the lectureships, etc., in the separate colleges. The university professors deliver lectures on the subjects for which they hold their professorships, but attendance on these lectures is compulsory on none of the students.

The colleges are corporate bodies distinct from the corporate body which forms the university. They are not subject to laws and regulations made by the university; they manage their own property, elect their own officers, and even the proctors have no power within their walls. Some university professors are entitled to privileges and emoluments in colleges, and in many matters the colleges and the university recognize each other's regulations. But the true key to the intimate relations existing between the university and colleges is to be found in the fact that the great majority of the members of the university belong to the colleges and all members of colleges are members of the university.

The old distinctions separating undergraduates into different classes (peers and their eldest sons, fellow and gentlemen commoners) have disappeared. "Scholars," that is, students who by competitive examination have obtained a place on the foundation of a college—carrying with it a stipend of \$400—wear gowns differing from those of ordinary students or "commoners." Every student on entering his college is assigned to a tutor, who is responsible for the direction of his studies, and to whom he may apply for advice. The morning is devoted to attending lectures, or to private reading; the afternoon or the early part of it is universally surrendered to outdoor exercise; the evening after "hall" (the common name for dinner), is given by reading men to their studies, as well as to the social and literary meetings which form so much of the charm of college life. There is a university club, known as the Union Society, in whose hall there is held a weekly debate on some public topic.

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There are also a dramatic club, and various musical societies which give performances regularly during term, besides many social clubs. The expenses of living at Oxford vary as the students; on the most economical system they cannot be brought below \$800 per annum. The total number of undergraduates on the books is about 3,600, but the number of those resident is usually 3,000.

There are four terms in the university year at Oxford; Michaelmas term, which lasts from 10 October to 17 December; Hilary or Lent, from 14 January to the day before Palm Sunday; Easter Term, from the Wednesday after Easter to the Friday before Whitsunday; and Trinity or Act term, from the day before Whitsunday to the Saturday after the first Tuesday of July; Michaelmas and Hilary terms are kept by six weeks' residence in each and Easter and Trinity terms either by three weeks' residence in each, or by 40 days' residence in both jointly.

The degrees conferred by the university are those of Bachelor and Master in Arts; Bachelor and Doctor in Divinity, Civil Law, Medicine, Letters, Science, and Music, and Bachelor and Master in Surgery. The most important function of the university, however, is the conferring of degrees in arts. Twelve terms of residence are required for the degree of B.A., which must be taken before any other degree (except those of B. Litt. or B. Sc. and Bachelor or Doctor of Music) can be conferred. No further residence is necessary for any degree, and no residence whatever is required for degrees in music. Candidates for the degree of B.A. must pass three distinct examinations: Responsions (known among undergraduates as "Smalls") before the masters of the schools (six in number); first public examination (Moderations or "Mods") before the examiners known as moderators (in the pass school six, in the classical school seven, in the mathematical three); and the second public examination (or "Greats") before the public examiners (six in the pass school, five in the school of *literæ humaniores*, and three, four, or five in each of the other eight honor schools, namely, mathematics, natural science, jurisprudence, modern history, theology, Oriental studies, English literature, and modern European languages. Candidates are admitted to pass Moderations at their second term, and to a Final Pass School as soon as they have passed Moderations. Honors may be obtained in each of the two public examinations. The first consists of an examination in Scripture, or an alternative Greek or Oriental book, and in either classics or mathematics for a pass or honors. Candidates are admitted to the honors examination only from the fifth to the eighth term from their matriculation, and are put to a much severer test than candidates for a mere pass. The successful candidates are arranged by the moderators according to merit in four classes, in each of which the names are published in alphabetical order—a feature of Oxford honor lists. In the second public examination honors are conferred in each of the nine honor schools already mentioned. Successful candidates are arranged by the public examiners in four classes according to merit, and their names published in these classes in alphabetical order. Candidates in the Pass School are examined in three subjects chosen from the fol-

lowing four groups: (1) Classics, classical history, Sanskrit, and Persian; (2) Modern languages and history, political economy, and a branch of legal study; (3) Mathematics and six branches of natural science; (4) Religious knowledge. Not more than two subjects may be chosen from any one group, but one of the subjects must either be classics (two books in Greek, or one Latin and one Greek), Sanskrit, Persian, or a modern language (either French or German, with composition and literary history). A B.A. may proceed to the degree of M.A. without further examination or exercise, in the twenty-seventh term from his matriculation, provided he has kept his name on the books of some college or hall, or upon the register of non-collegiate students, for 26 terms. In the case of all other degrees (except honorary ones) some examination or exercise is necessary.

Affiliated colleges are: St. David's College, Lampeter (1880); University College, Nottingham (1882); Firth College, Sheffield (1886); University College, Reading (1899); Hartley University College, Southampton (1903); Exeter Diocesan Training College (1906); and several colonial universities. Students accredited from these affiliated colleges are admitted to the Oxford public examinations after a reduced period of academical residence, they are not required to pass Responsions, and can take their B.A. degree after eight terms' residence, provided they have obtained honors at either the first or second public examinations.

The University of Oxford possessed the patronage of few church livings in its own right, but through an act of James I. Roman Catholics are disabled from presenting to any ecclesiastical benefice and their rights within 25 of the counties of England and Wales are made over to this university, those in the other 27 counties being conferred on that of Cambridge. Many of the colleges possess considerable ecclesiastical patronage. There are between 30 and 40 scholarships and exhibitions in the gift of the university, besides those belonging to the various colleges and halls. Of international importance are the Cecil Rhodes scholarships, dating from 1902, each of the annual value of \$1,500, to be held by students from every important British colony, from Germany, and from every State and Territory of the United States of America. There are also several valuable prizes, such as the Stanhope, for a historical essay; the Newdigate, for an English poem; and the Gaisford, for composition in Greek prose and verse. The Radcliffe travelling fellowships are awarded to enable students of Natural Science to prosecute their studies abroad. Consult: Clark, 'The Colleges of Oxford' (1891); Corbin, 'An American at Oxford' (1903); Fulleylove and Thomas, 'Oxford' (1904); A. Lang, 'Oxford Notes' (1879); Lyte, 'History of the University of Oxford' (1886); Rashdall, 'Universities of Europe in the Middle Ages' (1895); Goldwin Smith, 'Oxford and Her Colleges' (1895); the series of 'College Histories' and the 'University Calendar'; Hutton, 'Literary Landmarks of Oxford' (1903); and the 'Student's Handbook to the University and Colleges of Oxford.'

PHILIP MOLYNEUX,  
*Editor of the Oxford University 'Gazette.'*



## OXIDASE — OXYGEN

**Oxidase**, any member of a certain group of enzymes, which are distinguished, as a class, by their power of inducing the direct oxidation of sugars and certain other substances. The chemistry of the oxidases is very imperfectly known, but the group appears to be widely distributed in the vegetable kingdom, and it probably plays an important role in the chemical changes that occur in the growing plant.

**Oxide**, in chemistry, a compound formed by the direct union of oxygen with a metallic base, or with an organic radical. The oxides may be classified, in a general way, as acid, basic, and neutral. An acid oxide is one which has acidic properties, or which combines with the elements of water to produce an acid. Sulphur trioxide,  $\text{SO}_3$ , is a familiar example of this class of oxides, as it unites directly with water to produce sulphuric acid. Basic oxides are those which have basic properties, or which are capable of uniting with acids so as to produce salts. Calcium oxide (lime),  $\text{CaO}$ , is of this character. Neutral oxides are those which are neither acid nor basic in any marked degree. The magnetic oxide of iron  $\text{Fe}_3\text{O}_4$ , is an example of this class. The oxides are also classified in accordance with the proportion of oxygen and base that they contain. When two oxides of the same base are to be distinguished, that which contains the more oxygen in proportion to the base is sometimes called the peroxide, the other being called the suboxide.  $\text{CuO}$ , for example, may be called copper peroxide, and  $\text{Cu}_2\text{O}$  copper suboxide. These particular terms, however, are not used as generally as formerly. The term protoxide is sometimes applied to a neutral oxide which contains a single oxygen atom in combination with one atom of a divalent base, or with two atoms of a monovalent base. An oxide containing one, two, three, four or five atoms of oxygen, is called the monoxide, dioxide, trioxide, tetroxide, or pentoxide of the corresponding base. Occasional departures from this simple rule will be met with in modern chemical nomenclature, but in such cases the anomaly is due to some peculiarity in the behavior of the oxide or to the difficulty of changing a name after it has once been definitely adopted, even though it be erroneous when judged by correct principles. The gas whose formula is  $\text{NO}$ , for example, is commonly known as nitrogen dioxide, as though its formula were  $\text{N}_2\text{O}_2$ . A sesquioxide is an oxide containing three atoms of oxygen to two of the base; the name being derived from a Latin word signifying "one and a half." Sesquioxide of iron, for example, has the formula  $\text{Fe}_2\text{O}_3$ .

**Oxley**, òks'li, **James Macdonald**, Canadian author and lawyer: b. Halifax, Nova Scotia, 22 Oct. 1855. He was graduated from Dalhousie University, Halifax, in 1874, studied at Harvard in 1876-7; and was admitted to the bar in 1878. He practised law in Halifax in 1879-83, when appointed legal adviser in the Dominion department of marine and fisheries. He resigned from this office in 1891 and engaged in the life insurance business in Ottawa and Montreal. Beside 'Nova Scotia Decisions' (1880-3), he has written a long series of boys' books, such as 'Donald Grant's Development' (1892); 'Archie of Athabaska' (1893); 'In the Swing of the Sea' (1897); 'Fife and Drum at Louis-

burg' (1899); etc., and 'Lhasa at Last: a Journey to the Forbidden City of Tibet' (1900).

**Oxus**, òk'süs, **Amu, Amu Darya**, ä-moo' dār'yā, or **Jihoon**, jē'hoon, a large river in Asia, formed by several small rivers which have their sources in the Pamir Plateau, one being the outlet of a lake 14,000 feet above sea-level. The course at first is winding, then northwest to the Sea of Aral, which it enters by several mouths, forming a large marshy delta. At one time this river flowed into the Caspian Sea. The Oxus is about 1,500 miles long and navigable for about 1,000 miles. A Russian railroad to Samarcand crosses the river by a long bridge.

**Oxy-acids**, according to older chemical usage, are acids which contain oxygen; those containing hydrogen without oxygen being called hydracids. Nitric acid,  $\text{HNO}_3$ , for example, was called an oxy-acid, while hydrochloric acid,  $\text{HCl}$ , was called a hydracid. The term oxy-acid is not often used in this sense at the present time, but organic acids which contain the radical hydroxyl,  $\text{OH}$ , are frequently called oxy-acids, or, more correctly, hydroxy-acids. The organic acids of the lactic acid series, for example, may be regarded as derived from those of the acetic acid series by the substitution of a molecule of hydroxyl for an atom of hydrogen, and they are therefore oxy-acids, or hydroxy-acids, according to the more modern terminology. Acetic acid, for instance, has the formula  $\text{CH}_3\text{COOH}$ , and glycollic acid (which belongs to the lactic acid series) has the formula  $\text{CH}_2\text{OH.COOH}$ . Glycollic acid may therefore be regarded as oxy-acetic acid, or hydroxy-acetic acid, if considered as being derived by substituting  $\text{OH}$  for one of the hydrogen atoms of the methyl group in the acetic acid. Lactic acid itself may be regarded as hydroxy-propionic acid, the formula of propionic acid being  $\text{C}_2\text{H}_5\text{COOH}$ , while that of lactic acid is  $\text{C}_2\text{H}_5\text{OH.COOH}$ .

**Oxyacetic Acid.** See GLYCOLLIC ACID.

**Oxygen**, a non-metallic, gaseous element, discovered in 1774 by Priestley, who called it "dephlogisticated air." The name oxygen (Greek, "acid-forming") was given subsequently by Lavoisier, in the erroneous belief that this element is an essential constituent of all acids. Oxygen is one of the most abundant of the elements. It constitutes about one fifth of the bulk of the atmosphere (see AIR), where it exists in the free state, mixed with free nitrogen. Water is a compound of oxygen and hydrogen, eight ninths of it, by weight, being oxygen. Most of the rocks of the earth's crust are also rich in combined oxygen, and it is estimated that the crust, as a whole, contains from 40 to 50 per cent of its own weight of this element, the principal other elements present being silicon, calcium, and aluminum. Physically, oxygen is a colorless gas without odor or taste. It is slightly heavier than air, and Regnault found that one cubic decimetre of the gas, at 32° F. and under a pressure of 760 millimetres of mercury at Paris, weighs 1.4298 grams. By the application of a pressure of 3,000 atmospheres at ordinary temperatures, Amagat caused oxygen to become denser than water, although it was still undoubtedly gaseous in nature. The coefficient of expansion of ordinary oxygen, under a constant pressure of one

atmosphere, is given by Jolly as 0.0036743 (Centigrade scale). The specific heat of the gas at constant pressure, as compared with an equal weight of water, is given by Regnault as 0.2175; and Clausius gives 0.1551 as the corresponding value of the specific heat at constant volume. By the simultaneous application of great cold and pressure (see CRITICAL POINT), oxygen may be reduced to a transparent pale-blue liquid, which is markedly magnetic, and which boils at about  $366^{\circ}$  F. below zero, when exposed to the pressure due to 740 millimetres of mercury. Liquid oxygen has a density comparable with that of water, though it varies considerably with changes of temperature; and when cooled to a point that is something like  $400^{\circ}$  F. below zero, the liquefied gas freezes to a white solid.

Oxygen is a dyad element, and it combines directly with most of the other elements with the formation of compounds known as oxides (q.v.). It is also an essential constituent of multitudes of other compounds, both organic and inorganic; and from all points of view it may be said to be one of the most important elements in the entire known list. It is an active supporter of combustion, and in fact all of the familiar cases of combustion are merely instances in which oxygen is actively combining with other elements to form oxides. Oxygen has the chemical symbol O, and its atomic weight is 15.88 if that of hydrogen is taken as unity. The atomic weights being merely relative numbers, however, it is now more common to assume the atomic weight of oxygen to be precisely 16, in which case that of hydrogen is approximately 1.008. (See ATOMIC THEORY.) By taking O=16 instead of O=15.88, it is found that the atomic weights of most of the other elements are also more nearly expressible by integers—a circumstance which tends to simplify all exact chemical computations. The processes of animal life are necessarily accompanied by the gradual oxidation of the tissues of the body, this oxidation being effected within the tissues themselves by means of the oxygen absorbed by the blood from the air in the lungs. When pure oxygen is inhaled, the oxidation processes go on with abnormal activity, and a marked exhilaration almost amounting to intoxication is the result. Oxygen is somewhat soluble in cold water, so that lakes, streams, and the ocean itself, contain more or less of it in solution; and it is from this dissolved oxygen that fish and other marine creatures obtain the supplies that are needed for the normal oxidation of their tissues.

Oxygen may be prepared by the electrolysis of water, or, more conveniently, by heating a mixture of potassium chlorate and manganese dioxide. In the latter case the chlorate is decomposed with the liberation of oxygen gas, while the manganese dioxide apparently remains unaffected. The role of the dioxide is not well understood. Potassium chlorate evolves oxygen when heated alone, but the temperature at which the evolution takes place is much lower when the manganese dioxide is added. Various other methods are in use for the production of oxygen on a commercial scale, one of the most interesting of these being the barium process, which has been made practical largely through the labors of the brothers Brin. When

barium monoxide, BaO, is gently heated in contact with air, it absorbs oxygen and passes into the form of a dioxide, BaO<sub>2</sub>. The dioxide, so prepared, is then isolated and heated more strongly, whereupon it breaks up again into free oxygen and barium monoxide; the monoxide being thus caused, by indefinite repetitions of the process, first to absorb oxygen from the air at a low temperature, and then to give off the pure gas at a higher temperature. Although the fundamental idea of this process has been known for a long time, it is only in recent years that certain practical difficulties have been overcome, so as to make the process a commercial possibility.

Under the action of the electric spark, or the silent electric discharge, oxygen becomes partially converted into an allotropic form known as ozone, which has a density 50 per cent greater than that of ordinary oxygen. Ozone is also formed in the electrolysis of ice-cold dilute sulphuric acid, though ordinary oxygen is evolved at the same time. Ozone is bluish in color, and has a strong characteristic odor, which may often be noted in the vicinity of induction coils and other pieces of electrical apparatus that are giving off sparks. It is more magnetic than ordinary oxygen, and is also more active chemically. It possesses powerful bleaching properties, destroying many of the organic dye-stuffs and coloring matters. It also attacks and destroys rubber and other organic bodies that are not actively attacked by normal oxygen. When heated to  $520^{\circ}$  F. it becomes entirely converted into ordinary oxygen; and this conversion takes place explosively, with the development of a yellowish flame, when ozone is compressed suddenly, without permitting the heat developed by the compression to escape. When cooled to a temperature lower than  $220^{\circ}$  F. below zero, and subjected to a pressure of something over 100 atmospheres, ozone condenses into a dark-blue magnetic liquid. Traces of free ozone occur in the air of regions that are sparsely populated, but it can hardly be detected in city air, except during thunderstorms.

*Medical Uses of Oxygen.*—In medicine, oxygen is generally used by inhalation, either pure, or mingled with from one to four volumes of atmospheric air or of nitrous-oxide gas. It acts usually as a stimulant, increasing the force and velocity of the pulse, and is especially valuable in chronic bronchitis, pneumonia, and other affections where there is dyspnoea or asphyxia. It has also been used in chlorosis, albuminuria, dropsy, paralysis, and various other affections, but its effects have been often disappointing. In appropriate cases it may be given in from one to four gallons at a sitting, two or three times a day. But the gas must be pure, the reservoirs must have proper mouth-pieces, valves, and stopcocks, and the products of respiration must not pass into the reservoirs. Oxygen in too large a quantity relaxes and debilitates the system, producing narcotism. It should not be resorted to in any great quantity except under the direction of a physician, or at least some person understanding its physiological action.

**Oxyhæmoglobin.** See HÆMOGLOBIN.

**Oxyhydrogen Light.** See CALCIUM LIGHT.

## OXYRHYNCHUS — OYSTERS

**Oxyrhynchus**, òk - sī - rīng'kus, ancient name of a town in Egypt, now known as Bel-mesa. It is at present nothing but a heap of mounds, which cover an area surpassed by few ancient Egyptian towns. These mounds have recently been opened and explored and have yielded rich finds in papyri, containing many precious treasures of lost classical and early Christian literature. The Greek papyri unearthed in 1903 include a 3d century fragment of the so-called "logia" or 'Sayings of Jesus,' such as were discovered in the same place in 1897. Among the Latin papyri is a fragment of the epitome of Livy's history covering Books 37-39 and 49-55. On the back of this papyrus is written the largest piece of the New Testament on papyrus yet discovered, namely, the Epistle to the Hebrews. Another fragment comes from the Septuagint version of Genesis — a century older than extant vellum manuscripts of the same book. Among other Greek papyri is a 1st century B.C. copy of an epinician ode, by a poetess, perhaps Corinna, the rival and reputed teacher of Pindar; epigrams by Leonidas, Antipater, and Amyntas; part of a philosophical dialogue in which the tyrant Pisistratus is one of the speakers; a long 2d century papyrus contained an invocation to a goddess, and on the back an account of a miraculous cure effected by Imhotep, the Asclepius of the Greeks, and the Æsculapius of the Romans.

**Oxyrhynchus**, the name given by the Greeks to a fish of the Nile (*Mormyrus oxyrhynchus*), formerly revered by the Egyptians, who refrained from eating it. It was sacred to the goddess Hathor, and is frequently represented on sculptures and coins. The Egyptians embalmed and buried the oxyrhynchus with great pomp. Its modern name is "mizdeh." See **MORMYRUS**.

**Oxy'salt**, or **Oxisalt**, a salt of an oxy-acid. See **OXY-ACIDS**.

**Oxyuris**, a genus of small thread-worm parasitic in man. *O. vermicularis* is about one sixth of an inch, and the female about half an inch long, and inhabits the rectum of children and of old people in numbers, setting up inflammation. See **NEMATODA**; **THREAD-WORM**.

**Oyer** (oi'ér) and **Terminer**, tər'mī-nēr, Court of. See **COURT**.

**Oyster Bay**, N. Y., town in Nassau County, on the north coast of Long Island; on an inlet of Long Island Sound, and on the Long Island railroad; about 15 miles east of New York and 28 miles from City Hall. It is connected by steamers with New York and the large sound ports. Its name comes from its principal industry — cultivating oysters. Sea Cliff (pop. 1,694) and Farmingdale (pop. 1,567) are villages in the town. It is the home of ex-President Roosevelt. The government is administered by town meetings held biennially. Pop. (1910) 21,802.

**Oyster-catcher**, a shore-bird of the plover family, several species of which constitute the genus *Hamatopus*, characterized by lack of the hind toe. The bill is of great length, pentagonal at its base, slightly bent upward, and flattened or compressed at the apex, which is truncated. Oyster-catchers frequent both sea-coasts and inland waters, picking up small mollusks, crustaceans, sand-worms, etc. They are

18 to 20 inches long, and their plumage is handsomely variegated with black, white and brown, so that the Old World species (*H. ostralegus*) is often called "sea-pie" in England. The familiar American species is *H. palliatus*. It is to be found in all parts of the country, but is rare northward of the middle parts. Consult: Elliot, 'North American Shore Birds' (1895); Sandys and Van Dyke, 'Upland Game Birds' (1902).

**Oyster-crab**, or **Pea-crab**, a small crab (*Pinnoheres ostreum*) which dwells inside of the shells of American oysters as a commensal (see **COMMENSALISM**). Other species inhabit other host-shells in various parts of the world, one associated with a Mediterranean *Pinna* being the subject of some pleasant classical legends. These small crabs are excellent eating, but the difficulty of getting them in any considerable quantity makes them a costly dainty.

**Oyster-fish**, a local name for the tautog (q.v.).

**Oyster Plant**, **Vegetable Oyster**, **Salsify**, or **Salsafy**, a biennial composite herb (*Tragopogon porrifolius*). When in flower it is about four feet tall, bears grass-like leaves and showy, purple flowers, which close before noon. It is a native of Europe, whence it has spread as a weed to many countries. The cultivated varieties are grown for their gray tap-roots, which are often a foot long and two inches in diameter, and which suggest the flavor of oysters. The seed should be planted in deep, rich, well-drained soil as early in the spring as the ground can be worked, the drills being 15 or 18 inches apart. The plants must be cleanly cultivated until their tops cover the spaces between the drills. In late autumn part of the crop should be dug, the remaining part being allowed to stay until spring. Freezing does not harm the roots; indeed, they are believed to be better flavored if so treated. The stored roots are very apt to shrivel, become tough and lose flavor. Cool, moist storage, or pits, should obviate this difficulty. The plant succeeds best in cool climates and should be in every home garden. As a commercial vegetable it is of far less importance than parsnips and carrots.

**Oyster-shell Bark-louse**. See **SCALE INSECTS**.

**Oysters**, lamellibranch or bivalve mollusks of the family *Ostræidæ*, more strictly, edible species of the genus *Ostræa*, though the name is sometimes applied to other *Pelecypoda*, as the hammer oysters and pearl oysters of the family *Aviculidæ*. In the true oysters (*Ostræa*) the shells are irregular, the two valves unequal and the hinge without teeth. The animal is attached to some submerged object by the left valve, which becomes hollowed out to receive the body, while the right valve, which is free, is flattened or may be even concave from above. The shells are closed by a single adductor muscle, popularly called "heart," which extends from about the centre of one valve, through the animal, to the other. The edges of the mantle are free from each other and are fringed upon the margin. The gills (called "beard" in cook-books) are nearly equal and coherent dorsally, and the labial palpi are triangular. The oysters are peculiar in that the intestine does not run through the heart, which lies anterior to the:

## OYSTERS

muscle, while the foot is small or even entirely absent, a result of the sedentary life.

About 70 recent species of *Ostræa* are recognized, mostly inhabitants of the warmer seas. The most important species are the common oysters of Europe (*O. edulis* et al.), the *Ostræa virginiana* of the eastern coast of America, and the Japanese oyster (*O. cucullata*). The first mentioned species occur from Norway and the Baltic to England and into the Mediterranean, another species of less importance (*O. adriatica*) taking their place in the eastern Mediterranean and the Black Sea. At one time *O. virginiana* ranged along our whole eastern coast, from the Gulf of Saint Lawrence to the Gulf of Mexico, and was used extensively by the Indians, but since the growth of civilization there it has disappeared from the whole coast between Nova Scotia and Cape Cod. There still remain beds in the Bay of Chaleur and around Prince Edward Island. It has been introduced at points on the Pacific coast. On the Pacific coast two native species are eaten, *O. conchophila* of California and *O. lurida* of the coasts farther north. In the tropics species belonging to the subgenus *Alectryonia* become attached to the roots of the mangroves and are exposed at low tides; these are the so-called "tree oysters" or mangrove oysters.

Oysters, like all other mollusks, reproduce exclusively by eggs. Our *O. virginiana* has the sexes separate, but the European oysters and one of the Pacific species are hermaphroditic. The Eastern oyster is very prolific, producing from 10,000,000 to 60,000,000 eggs. Fertilization takes place by the admixture of the ova and sperm in the water. From the eggs there hatch out small, free-swimming larvæ, which swim about until after the first appearance of the shell, and thus aid in the distribution of the species. They swim by means of a ciliated velum or foot, and the valves of the horny larval shell are symmetrical like those of a clam, while the single muscle uniting them is not the same as that which appears in the adult. After a few days this free life ceases and the young become attached by the left mantle fold, which secretes a limy deposit at its margin. They are known as "spat" and grow rapidly, feeding upon the microscopic life in the water which is conveyed to the mouth by the cilia covering all parts of the body, and especially the gills and labial palpi. When large enough for transplantation the young are termed "seed oysters." As will be seen from the foregoing, the oyster needs some solid support upon which to attach itself, otherwise it would sink in the mud and become smothered. In nature this support is furnished by reefs of rocks or by banks of old oyster shells.

On the natural oyster beds a very small percentage of the eggs is ever fertilized and vast numbers of the swimming larvæ are destroyed by failure to secure attachment, or by being swallowed by certain surface-feeding fishes, or by numerous lower animals which, like the adult oysters, sweep their food into the mouth by ciliary action. Many young oysters are destroyed by a host of enemies that prey upon them; others are suffocated by luxuriant plant and animal growths, including older individuals of their own species, or by sedimentary deposits; sudden freshets kill great numbers; storms tear them up and cast them ashore, and those which,

like the "raccoon" oysters, live on tidal flats are sometimes destroyed in great numbers by ice in the winter or by too long exposure to the sun's rays in summer. Notwithstanding all this destruction the oyster is so prolific that, except along the New England coast north of Cape Cod, where a change in physical conditions has proved detrimental to its existence, the beds have continued to extend until subjected to the destructive influence of the white man, and have become the foundation for the development of a mutualistic fauna and flora almost as rich, varied, and complex as that of a coral reef.

**Culture.**—As long as the market for Eastern oysters was limited to a relatively narrow belt along the seaboard, and before the population of some parts of this region had reached its present congested state, the extensive natural beds of Chesapeake Bay and other parts of the coast afforded a sufficient supply. Increasing demand long since led to over-fishing, which menaced the natural beds and compelled the development of new ones by planting suitable barren bottoms, often in regions where the oyster does not naturally breed. Extensive acreage has thus been developed and rendered productive, especially in Long Island Sound and other regions where suitable riparian laws secure the rights of private ownership. Attempts to establish close seasons and similar legislative devices have proved of little avail and have generally led only to more intensive harvesting during the open season. With the further widening of the market, due to improved transportation facilities and the introduction of the refrigerator car, the demand has severely pressed upon all sources of supply. This healthy condition of the oyster industry has stimulated a serious interest in the problems and possibilities of oyster culture and has led to the survey of suitable grounds for planting, from New Jersey to Texas. Vast neglected areas in the shallow bays and sounds along many parts of our coast could, by intelligent preparation and planting to oysters, be transformed from unproductive mud banks into rich sources of food supply and revenue. But no one should venture into this field without a full understanding of the complex biological and physical factors involved. To do otherwise is to invite disappointment and financial loss.

The successful maintenance of planted oysters is dependent upon the proper consideration of the character of bottom, the depth, temperature and density of the water, the food supply for the growing oysters, the rate of sedimentation, and the methods of collecting the marketable oysters, combating enemies, and many minor matters.

Selection of a suitable bottom is of prime importance, and the ideal condition is found in one presenting a firm substratum of stones or clay covered by two or three inches of loose organic mud. The first furnishes a foundation, the latter a suitable nidus for the growth of the minute organisms which constitute the oyster's food. Rocky, clayey, or sandy bottoms are generally poor food producers, and the latter are peculiarly liable to shifting by currents, with a resulting burial and destruction of the oysters. Deep, soft mud engulfs and suffocates the oysters. Too rapid a deposition of sediment has the same result and is especially fatal to young and small oysters.

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As indicated by their extensive geographical distribution oysters naturally withstand a range of temperature from below freezing to above 90°, but when subjected to these extremes they undoubtedly deteriorate and in time succumb. In common with other organisms oysters grow most rapidly in warm waters and find their optimum temperature between 60° and 70°. If it be desired to establish self-perpetuating beds it is important that the temperature should reach an even higher point during the summer in order to stimulate natural reproduction. Being naturally brackish water animals oysters do not thrive in water of full sea salinity and become of very poor quality when the percentage of salts falls too low. In commercial quantities they inhabit water of densities between about 1.008 and 1.022. It is important to so locate beds that they shall be free from inundating freshets. While oysters are generally planted in shallow bays and coves at depths of from 1 to 5 or 6 fathoms luxuriant natural beds are found from above low water to a depth of 20 fathoms, and in Long Island Sound planting is practised to 15 fathoms.

The food of oysters consists of a great variety of minute animals and plants, protozoans, the eggs and swimming larvæ of many kinds of sponges, worms and mollusks, including their own, the spores of algæ and especially the minute plants known as diatoms. The latter live in enormous numbers on the surface of the mud in shallow bays, and during warm weather multiply with great rapidity. As they constitute the bulk of the oyster's food the importance of determining their abundance in advance is self evident. The other organisms chiefly belong to the associations that become established on the oyster beds and their occurrence need not be so carefully predetermined. It is possible to establish highly successful beds at some distance from the diatom garden if strong tidal or other currents pass from the latter to the former. The existence of such currents is beneficial in many other ways also than as food carriers. They sweep the beds clean of sediment, insure a ready supply of oxygen and increase the fecundity of the beds by bringing the ova and spermatozoa in contact and by carrying the young swimming spat to suitable places of attachment.

All of these conditions having been satisfactorily determined and the site for a bed located the planter first marks its boundaries by stakes or buoys. The bottom is then smoothed and cleared of snags and debris either at low tide or by means of tongs or dredges according to the depth. If the bottom is covered by more than an inch or two of mud it is prepared by strewing it with an even layer of shells, gravel, slag, cinders or similar material. These furnish a foundation, and, if the bed be suitably related to a spawning ground, serve at the same time as a "cultch" on which the spat will settle. In this case nothing further need be done but to await developments and care for and protect the beds. But if this is not the case young or "seed" oysters must be provided. These are usually from 1 to 1½ inches in diameter and are obtained either by dredging the gravel and shells from natural beds or by spreading on the bottom suitable shells or other "cultch" to collect the spat; when they are raised and spread over the

prepared bottom, usually to the extent of 300 to 600 bushels per acre. While very soft bottoms are usually unfavorable for planting they may sometimes be prepared by covering with a layer of brush and it is probable that either by this method or by building open platforms many such places will be utilized in the future. From one to four years, depending on the richness of the food supply, are required to mature seed oysters. In order to make a portion of the supply available each year, the bed should be staked off into 3 or 4 sections, only one of which is dredged annually, the others remaining undisturbed to collect spat and mature their growth.

Among the teeming life of the oyster beds are found many plants and animals which are more or less destructive, especially to the young and thin-shelled oysters. Strong growths of eel grass and algæ, as well as boring sponges and similar animals, should be kept in check by mowing, or dredged and removed when necessary. More serious pests are drills, a gastropod mollusk (*Urosalpinx*), which perforates the shells and destroys young oysters, especially southward; starfishes, which often sweep over the Long Island Sound beds in such vast armies that all but the very largest oysters are devoured; and drumfish and stingrays, the former of which creates great havoc in New Jersey, the latter in California. Strong stockades of stakes are a sufficient bar to the larger fishes. Prompt and energetic use of great mops in which they become entangled will greatly reduce the number of starfishes, which can be used as fertilizers on the land. Large numbers of drills may be captured by the use of an ingenious box dredge provided with a screen cover which excludes the oysters while the drills drop through its meshes into the interior.

For a few weeks previous to marketing many oyster farmers transfer a portion of their crop from the beds in deeper waters to warm shallows, where the greater abundance of food causes them to fatten and improve in flavor. Such oysters are highly esteemed and have an enhanced value. This process must not be confused with "plumping," which, though also known as fattening, consists simply in changing the oysters to waters of a lower density for a few days. As a result they absorb water and become bloated. They gain nothing in nutrient value and deteriorate in flavor, but appearing plump and full find a ready sale at a higher price.

While the practicability of some forms of pond culture in the United States has received experimental demonstration and enormous possibilities for future extension of the oyster industry by this means are indicated, the demand has not yet led to the employment of the capital required for its development on a commercial scale. Important advantages of pond culture lie in the possibility of increasing fecundity by artificial propagation and more efficient collection of the spat, the control of the food supply, and the exclusion of enemies. The immediate prospects are that the next practical step in the development of oyster culture in this country will be in the direction of raising in artificial enclosures seed oysters for planting beds on natural and prepared bottoms.

Cultural methods have attained a high degree of perfection in various European countries, es-

pecially in France and Holland, and in Japan. In France *O. edulis* and allied species are cultivated in oyster parks. The "spat" is collected on fagots of brush, tiles, or other collectors placed in proximity to spawning beds. The "seed" oysters are then removed to partially inclosed growing-ponds admitting the tides through sluices and flood-gates. When fully grown they are fattened and flavored in small inclosed ponds or "cloires." While some of these refined methods will doubtless serve as the basis of a future oyster culture on parts of the Atlantic seaboard, the simpler Japanese methods seem better adapted to the culture of the oysters of our Pacific coast. The oyster culture of Japan reaches its highest development in the Inland Sea and is concerned chiefly with *O. cucullata*. As in France, the exact methods employed differ greatly with the locality, but in general the farms are in shallow brackish waters, where the great tidal rise and fall leaves large areas exposed at low water. They are laid out with reference to the direction of the currents, topography of the bottom, etc., and each is inclosed by a bamboo fence or hedge. This area is then planted with bamboo stakes stuck into the ground and variously laid out in straight parallel fences with suitable alleys and aisles or in groups arranged in rows, circles, etc. These serve to collect the spat and to hold the growing oysters. In districts where growth ceases in two years two sets of fences arranged alternately are employed, one set being culled and rebuilt each year. In other districts the oysters are moved annually from shallow into deeper water until the end of the third or fourth year, the shallows near the shore being employed for spat collection, the moderate depths for growing bottoms and the deeper waters of each farm for fattening.

The latest available statistics of oyster production are of different dates: For the South Atlantic and Gulf States, 1902; for New England, 1905; the Pacific Coast, 1904; for the Middle Atlantic States, 1904; for Europe, about 1900.

	BUSHELS	FIRST VALUE
New England States.....	33,220,104	\$3,961,785
Middle Atlantic States.....	125,066,711	11,547,629
South Atlantic States.....	22,719,074	644,478
Gulf States.....	34,115,935	1,263,689
Pacific Coast States.....	2,665,696	1,031,523
Total United States.....	217,787,610	\$18,449,104

	BUSHELS	FIRST VALUE
Great Britain.....	2,760,000	\$6,200,000
Holland.....	70,000	450,000
France.....	2,000,000	5,000,000
Italy.....	65,000	200,000
Germany.....	13,000	75,000
Canada.....	164,000	185,000
Other countries.....	400,000	600,000

Totals, all other countries. 5,472,000 \$12,550,000

In the United States oysters are collected from the beds, whether natural or artificial, in two ways. In the shallower waters they are taken by means of oyster-tongs, which are like two long-tined rakes, hinged so as to open and close like shears. In deeper water (down to 15 or 20 fathoms) recourse is had to the dredge worked by steam or sail boats. This is a rectangular iron frame-work, about four feet across, with sharp edges, or with long teeth upon one side, while attached to the other is a large

open-work bag of cord or iron. This dredge is dragged over the bottom, the teeth or sharp edges tearing the oysters loose, when they are caught in the bag and brought to the surface.

**Bibliography.**—The importance of the oyster industry has led to the development of an extensive literature to which the following, chiefly government publications, are introductory: Brooks, *et al.*, 'Report of the Oyster Commission of the State of Maryland' (Annapolis, 1884); Ingersoll, 'The Oyster Industry' (Tenth Census Report, 1881); Winslow, 'Report on Oyster Beds of James River and Tangier and Pokomoke Sounds' (U. S. Coast and Geodetic Survey, 1882); Swift, 'Survey of Oyster Regions of Florida' (Rep. U. S. Fish Com., 1897); Ryder, 'Principles of a Rational System of Oyster Culture' (Id., 1886); Moore, 'Report on Oyster Beds of Louisiana' (Id., 1899); Dean, 'Present Methods of Oyster-culture in France' (Bull. U. S. F. C., 1890); Dean, 'European Methods of Oyster-culture' (Id., 1891); Dean, 'Japanese Oyster-culture' (Id., 1903); Moore, 'Manual of Fish-culture' (Washington, 1897); Huxley, 'Oyster Industry of England' ('English Illustrated Magazine,' Vol. I.). Numerous additional biological, cultural and statistical papers may be found in the publications of the U. S. Bureau of Fisheries, including in the earlier volumes some translations of important papers by European authorities. The Commissions of Maryland, New Jersey, etc., have also issued important reports, generally of more local interest.

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**Ozæna**, a discharge of fetid, purulent, or sanious matter from the nostrils. It is a symptom rather than a disease, and may arise from ulceration of the membrane lining the nostrils, or from caries of the adjacent bones.

**Ozanam, Frederick**, French author, professor, and philanthropist: b. Milan 23 April 1813; d. Marseilles, France, 8 Sept. 1853. He was the second son of an eminent physician, Antoine Ozanam, a descendant of a long line of scholars and scientists. Soon after the birth of Frederick, the family returned to their native city, Lyons. Great care was exercised in the early education of the boy. The teacher who exerted the most influence over young Ozanam was Abbé Noirot. He was the youngest of 130 pupils; but nearly all the time he was a pupil in this famous school he led his class. He was well versed in the grammar and literature of English, German, Hebrew, and Sanscrit, and was one of the eminent French scholars of the time. At an early age his writings attracted the attention of such men as Lamartine and his associates. After finishing his college course he began the study of law. It was while a law student in Paris that he formed the acquaintance of and became friends with Marie Ampère, the mathematician; Chateaubriand (q.v.); Lacordaire (q.v.), and a number of the writers and professional men of France.

His first public work was an attack on the doctrines advanced by the St. Simonians. In reply to Ozanam's attack on their doctrines, the St. Simonians accused the followers of Ozanam of doing nothing but advance theories. In May 1833, Ozanam and a few chosen companions held a meeting to consider ways and means of com-



## OZARK MOUNTAINS—OZONE

bating the St. Simonians. At the suggestion of Ozanam it was resolved that they should unite in giving personal service "to God in the persons of the poor, whom they were to visit at their own dwellings and assist by every means in their power." This meeting was really the beginning of the Society of Saint Vincent de Paul (q.v.). The members of this new organization were to do more than give alms; they were to place their intelligence, their education, their special knowledge of law and science, and their general knowledge of life, at the disposal of the poor.

Ozanam is regarded as the founder of the now great Society of Saint Vincent de Paul; but he always, in his humility, repudiated the title of founder. "We were eight," he would say in contradiction to one founder. He was one of the first, if not the first, to introduce Dante to the French people. His thesis on Dante when, in 1838, he went up for the degree of Doctor of Laws, electrified Paris. His audience wept, applauded, and at the close rose *en masse* and expressed their appreciation. He was only 26 years of age when he was appointed to the municipal chair of law in Lyons. Later he accepted the chair of foreign literature at the Sorbonne. When he began his work at the Sorbonne he was 27 years of age and had been married only a few weeks. His work here showed that he was a master among instructors, a leader among students of literature; but his great aim was "to make men of his pupils," to impart to them manliness, vigor, and love of work.

In 1843 he was one of the group who founded the literary association called the "Cercle Catholique." Some of those interested in this movement were Lacordaire, Montalambert (q.v.), De Ravignan, and Bautain. Ozanam was made president. His speech on the literary duties of Christians was one of the great attractions of the first year. He shone as a scholar and an orator, and he was recognized as a most indus-

trious student; but he is best known to-day for his personal service to the poor and the ignorant and his advocacy of the work of the Society of Saint Vincent de Paul. His best known books are 'Les Poetes Franciscains'; 'Dante's Divina Commedia'; 'Les Germains.' Consult: O'Meara, 'Life and Works of Ozanam'; 'Letters of Ozanam.'

B. ELLEN BURKE,

Editor 'The Sunday Companion.'

**Ozark** (ô-zärk') **Mountains**, a plateau region, from 1,200 to 1,800 feet above the sea-level, extending with gradual upliftings from the southern part of Illinois into Missouri, then sloping down enters Arkansas and Indian Territory and extends into Kansas. The highest point is Pilot Knob, in Iron County, Mo. The hills are in separate peaks or knobs, and not in continuous ridges. The irregularities which show mountain making processes as existing are not visible here; the Ozark Mountains or Ozark Plateau, belong with the oldest mountain regions of the world, and denudation is slowly and surely removing the last remnants of once lofty mountains. The plateau belongs to the Tertiary Period, but Pilot Knob and vicinity belong to the Paleozoic Age. North of the Ozark slope and south of the Mississippi River is an old flood plain. On the southern slope are large forests.

**Ozena.** See NOSE AND THROAT.

**Ozoce'rite, or Ozokerite.** See HATCHETTITE.

**O'zone**, a colorless gas like oxygen, having a peculiar odor like that of air and a chemical activity. The density of ozone is one and one-half times that of oxygen and is charged into oxygen only at a high temperature. Ozone is found in country atmosphere to a much greater extent than in cities and towns. It is an intense purifier and is destructive to offensive odors. See OXYGEN; ALLOTROPY.

# P

**P** the sixteenth letter of the English and various other alphabets, is the sharp labial consonant pronounced when, the lips being closely compressed, they are separated by a forcible emission of the breath.

Like *k* and *t*, it is a pure mute or surd, involving no action of the vocal chords: it differs from *b* in that *b* is sonant: with the same compression of the lips as in *p*, the effort to pronounce *b* produces a vocal sound within the oral cavity. The form of this letter, *P*, comes from the Latin alphabet: the same speech-element is called *pi* in Greek and its form is *Π*, *π* while in the Greek alphabet our character *P* is called *rho*, equivalent to *r*. In early Phœnician writing the element *p* was represented by a vertical stroke curved or crooked to the left at the top (*ʔ*): this form was also used in early Greek, but with the crook directed to the right, (*ρ*): afterward the crook was made angular, (*Ρ*), and finally the two downward strokes were made of one length (*Π*). In early Latin the *p* had the form (*Π*), but this was changed to (*P*) and finally the rounded form was adopted, *P*. The surd labial *p* is freely interchanged with *b*, *f* and *v*, for they are all of the class of labials and dentilabials.

Languages springing from a common original differ from one another in the preference they show for *p*, *b*, *f*, or *v*. The English language has very few words of Germanic origin beginning with *p*: such words in English are nearly all of Latin, Greek, or Celtic origin. In German very many words of Latin origin, as *palatinatus* (from *palatium*), *papa*, *palus* (stake), *persona* (parson), *pavo* (peafowl), *præbenda* (prebend), *piper* (pepper) become *pfalz*, *pfaffe*, *pfal*, *pfarrer*, *pfau*, *pfründe*, *pfef-fer*, etc. The digraph *ph* was originally used by the Latins to represent the sound of the Greek letter *phi* (*Φ*, *φ*), which must have been different from the sound of the Latin letter *f*; else the Greek words *philosophia*, *pharmakon*, *phonas-kos*, etc., would have been written *filosofia*, *farmacum*, *fonascus*, as the modern Italians write everywhere *f* for *ph*—*filosofia*, *fisica*, *Filomena*, etc. There are no native English words beginning with *p* followed by *n*, *s*, or *t*; but there are many such words of Greek origin: in those words the *p* is silent. The *p* between *m* and *t* in *attempt*, *contempt*, etc., is introduced to facilitate the utterance of the *m*: but in such words as *exemption* (exemshun), *redemption* (redemshun), etc., there is no need of this mediating *p* and it is silent in correct pronunciation.

**Paca**, *pā'ka*, **William**, signer of the Declaration of Independence: *b.* Wye Hall, Hartford

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County, Md., 31 Oct. 1740; *d.* there 1799. He studied at Philadelphia College, where he was graduated in 1758, and in the Middle Temple in London; practised law in Annapolis; became a patriot leader; was a member of the Legislature 1761 and 1771-4, of the committee of correspondence 1774, of the Continental Congress 1774-9, and of the State senate 1777-9. His career as judge began in 1778, when he became chief judge of the Maryland superior court; from 1780 to 1782 he was chief judge of the court of appeals for admiralty and prize cases. In 1782-6 he was governor of the State; in 1788 was a member of the State convention which ratified the Federal Constitution; and for the last 10 years of his life was United States district judge. His wealth and influence had been lavishly given to the Revolutionary cause, and he, more than any one man perhaps, overcame the opposition in Maryland to that cause.

**Paca**, a large agouti-like animal (*Cælogenys paca*) of eastern South America, robust in form, with a broad, swollen head, caused by the great expansion of the zygomatic arches, and large eyes and ears. It is about two feet long, and a foot tall; the tail is a mere rudiment, and the color brown, marked with rows of oblong whitish spots. It lives near water, in which it is much at home, and digs shallow burrows in which a single young one is produced annually. It remains hidden by day, and seeks its plant-food by night, often making destructive forays upon plantations, especially of sugarcane. The flesh is edible, and the hide useful for leather. Two or three other less common species are recorded. Consult: South American authors, and Lydekker, 'Royal Natural History' (1895).

**Pacaja** (*pā-kā-zhā'*) **Indians**, a South American tribe of the lower Amazon region, which formerly occupied a large part of the mainland near the island of Marajo. They lived in large villages and were mostly devoted to agriculture. Of recent years they have disappeared as a distinct tribe, having been absorbed by other native bands.

**Pacay**, *pā-kā'*, a Peruvian leguminous tree (*Prosopis dulcis*) related to the mesquite. The pure white, flaky matter in which the seeds are embedded is used as food, and the pods, which are nearly 2 feet long, serve for feeding cattle.

**Paccaritambo**, *pāk-kā-rē-tām'bō*, or **Paccaritampu**, Peruvian cave south of Cuzco, on the Vilcamija River, reputed among the Incas as the place where Manco Capa and his brothers appeared first on earth, and styled "House of Dawn," in Quicha Paccaritampu.

## PACCHIAROTI — PACHYDERMATA

**Pacchiaroti, Giacomo**, jā'kō-mō pak-kē-ä-rō'tē, Italian painter: b. Sienna 1474; d. France 1540. When a boy he showed a taste for devotional art and was placed in the studio of Bernardino Fungai, a Siennese artist of contemporary fame. In 1535 he headed a conspiracy against the government of the city and fled for his life to France, where he worked under De Rossi, the famous Italian painter, sculptor and architect, who had been invited to court by Francis I. While his main works in fresco and oil are at Sienna, his 'Francesco d'Assisi' and 'Madonna and Child' in the Munich Pinakothek are among the gems of that collection.

**Pace**, a measure of length, used as a unit for long distances. The Latin pace was measured from the mark of the heel of one foot to the heel of the same foot when it next touched the ground, thus stretching over two steps; while the English pace is measured from heel to heel in a single step. The Latin pace was somewhat less than 5 feet; the English military pace at the ordinary marching rate is 2½ feet, and at double quick time 3 feet. The pace is of course of little service as a unit of measure, except with disciplined troops who are always accustomed to take steps of equal length.

**Pacer**. See HORSE, THE; HORSE-RACING.

**Pachacamac**, pāch-ä-kä'māk, ruined city and temple in the district of the same name in Peru. The village now occupying the site is called La Mamacoma and is the terminus of a railway from Lima, 20 miles to the northwest; and is situated near the Rio de Lurin. The ancient city, a sacred city and quasi-Mecca of both the Incas and the earlier Yuncas, was devoted to Pachacamac, the supreme god and creator of all in the Yunca theogony, and in the time of the Incas to a temple of the Sun. The outlines of the old city are clearly visible; it had broad regular streets and its entire site, a lofty hill, was elaborately terraced. On its top was the temple of Pachacamac, about 200 yards long and 150 wide. A cemetery surrounds this temple and is very rich in remains of the pre-Incan civilization, especially household utensils, which were buried with the flexed corpses. The Inca convent on lower ground is an adobe building, 116 yards long and 67 wide, and contains 18 cells. The remains of tiny huts at the foot of the hill probably point to pilgrimages to these shrines, being no doubt inns, for the entertainments of the pious visitor. Pizarro sacked the shrine in 1523, destroyed a wooden idol, and, it is said carried away 1,700 pounds of gold and 1,600 of silver. Consult: Squier, 'Peru' (1853), and Wiener, 'Pérou et Bolivie' (1880).

The district of Pachacamac is an administrative division of the province and department of Lima, with about 1,300 inhabitants. The same name is borne by an island off the coast of Peru near Lurin.

**Pacheco, Francisco**, frān-thēs'kō pā-chä'-kō, Spanish painter and writer on art: b. Seville 1571; d. there 1654. As a theorist in the art of painting Pacheco occupies a unique position in the history of the Seville School. His pictures are elaborate in their skilful embodiment of the principles he expounded in his 'Arte de la Pintura' (the Art of Painting). His treatise, however, did much for art in Spain,

and he was the master both of Alonzo Cani and Velasquez, the latter of whom became his son-in-law. In his 'Last Judgment' (painted for the nunnery of Saint Isabel) he introduced his own portrait, and ambitious and learned as many of his pictures are his small portraits, some of them in crayon, are among the best of his works.

**Pachmann, päh'män, Vladimir de**, Russian pianist: b. Odessa 27 July 1848. He studied music with his father, an amateur violinist, and with Dachs at the Vienna Conservatory; made his first appearance in 1869; after eight years of retirement made his first tour; again retired for two years; in 1882-3 played successfully in Vienna, Paris, and London; came to the United States in 1890; and toured in 1899 and 1900.

**Pachomius, pa-kō'mī-ūs, Saint**, Egyptian ascetic of the 4th century: b. Thebaid about 270; d. Proii, Egyptian Thebaid, 348. In early life he was drafted as a conscript in the army of Maximin, and at Thebes met Christians, whose teaching so interested him that on the conclusion of the campaign of Maximin against Constantine and Licinius he was baptised and embraced the life of an anchorite. His guide in his choice was Palemon, who accompanied him to Tabenna, an island in the Nile, where they took up their residence. In 326 he founded the first monastic community and he is spoken of by the learned Tillemont as "the institutor not only of certain monasteries, but of the conventual life itself, and of the holy communities of men devoted to religious life."

**Pachuca, pä-choo'kä**, Mexico, capital of the State of Hidalgo, 62 miles by railway north-east from the City of Mexico; elevation 7,831 feet above the sea. Three railways,—the Hidalgo, and branches of the Mexican and Mexican Central,—supply transportation facilities. The mountains rising on three sides form an amphitheatre in which the city is situated and from which it looks out toward the southwest upon a rich and highly cultivated plain. These mountains are honeycombed with producing mines down to the very door of the city itself, within the boundaries of which are several important establishments for treating ores, some of which have been in operation since the early days of mining in this district. The mountains behind the city form the northeast boundary of the Valley of Mexico, and within their shadows is produced almost or quite one third in value of the annual output of Mexico. The city is essentially a mining community and is not especially noted for any other industry. It has a strong financial institution,—the Bank of Hidalgo,—with a capital of \$1,000,000, a branch of the National Bank and an agency of the Bank of London and Mexico. There are two public libraries, containing together over 5,000 volumes, and a number of churches and schools. Bartolome de Medina, who, in 1557 discovered the patio process of amalgamating ores, which is still largely in use by Mexican miners, lived in Pachuca. Pop. about 41,000.

**Pachydermata**, the name formerly applied to a division or order of mammalia including the elephants, tapirs, hippopotamus, rhinoceros, swine, and hyrax—all of which forms were distinguished by their thick skin, by their non-

## PACIFIC OCEAN

ruminant habits, and by their possessing more than one hoof on each leg. This classification has, however, given place to a more scientific and natural arrangement, in which the several forms are placed according to fundamental structural affinities. Thus the elephants form a distinct order, the *Proboscidea*. The rhinoceros and tapirs are included in the division *Perissodactyla* of the ungulate order; the hippopotamus and swine are arranged in the section *Artiodactyla* of the same order; while the hyrax has a separate order—*Hyracoidea*—to itself. See UNGULATA.

**Pacific Ocean**, also formerly called the **SOUTH SEA**, the largest of the five great basins of the hydrosphere, extending for 133° of latitude and 180° of longitude, between the west coast of the North and South American continents, and the east coast of Asia and Australia. It exceeds in compass the whole of the four continents taken together, and occupies more than a third part of the earth's area. On the west it borders on the Indian Ocean, on the north it communicates with the Arctic Ocean by Bering Strait, on the south it is bounded by the Antarctic Ocean, and on the east it joins the Atlantic at Cape Horn. Within this enormous circumference it includes the numerous islands composing the groups of Australasia, Polynesia, Melanesia, and Micronesia, the islands on the west coast of America, and those on the east and south coasts of Asia. The Pacific Ocean is divided into—(1) the North Pacific, bounded on the south by the tropic of Cancer, and comprising in the north and west the Seas of Kamchatka and Okhotsk, the Japanese Sea, the East or North China Sea, and the Yellow Sea, and in the east the Gulf of California; (2) the Central Pacific, stretching between the tropics, and comprehending the greater part of the numerous and beautiful insular groups known by the collective name of Polynesia; and, (3) the Southern Pacific, or South Sea proper, extending from the tropic of Capricorn to the Antarctic Ocean, and not diversified by many islands. The Pacific Ocean receives most of its affluents from the Asiatic continent, the principal rivers being the Amur, Hoang-ho, and Yang-tse-kiang; while from South America, owing to the proximity of the Cordilleras to the coast, it receives no stream of any consequence, and from North America only the Yukon, Columbia, and the Rio Colorado.

The islands of this ocean are so numerous that it is difficult to give an enumeration of them, even in groups. Commencing on the American coast at the Strait of Magellan, and proceeding north, an uninterrupted chain lines the shores of Chile, and terminates in the large island of Chiloe. Many islets occur along the stretch of coast farther northward, and at the equator, about 700 miles west from the mainland is the interesting Galapagos group. Northward along the coasts of Mexico and the United States are the Revillagigedo, Alijos, Guadalupe, and several other small groups, while lining the coasts of Canada and Alaska is a chain of large islands, including among others those of Vancouver and Queen Charlotte. Turning west the Kodiak Archipelago lies at some distance off the east coast of Alaska, and the still larger chain of the Aleutian Islands, curving southwest from the extremity of that peninsula, and terminating

the groups of the Pacific, so far as belonging to the American continent. On the opposite continent of Asia the islands commence with the Kurile chain, stretching southwest from the extremity of the Peninsula of Kamchatka, and afterward continued in the same direction by the far more important islands of Japan, the Philippines, and other large islands of the Indian Archipelago. In the south region of the Pacific, beyond the tropic of Capricorn, the islands are few in number, but include the important group of New Zealand. Between the tropics the principal groups are, north of the equator, the Hawaiian, Ladrone or Mariana, and Caroline Islands; and south of the equator, the Marquesas, Low Archipelago, Society, Friendly, Fiji, New Caledonia, New Hebrides, and Solomon groups.

The bed of the Pacific is composed largely of Red clay, with extensive sections of Blue and Coral muds, Globigerina, Radiolarian, Diatom and Pteropod oozes, and in the eastern portion and south of Australia and New Zealand is fairly regular, ranging from 1,000 to 2,000 fathoms in depth. In the north, northwest and the south, east of New Zealand are extensive deeps, the Tuscarora deep east of Kamchatka, the Kurile Islands, and Japan, having a depth greater than 4,000 fathoms, the Aldrich deep east of New Zealand, over 5,100 fathoms. Between Guam and Midway Islands (q.v.) the United States telegraph ship Nero in 1900 sounded a depth of 5,269 fathoms. See MOUNTAINS: OCEAN.

The general laws regulating winds, tides, and currents suffer fewer modifications in the Pacific, than in narrow seas. The tidal wave, commencing at the equator, diverges from it toward the poles, and, proceeding with great velocity, and without an obstruction, is scarcely perceptible among the central islands of the Pacific. Hence in the Low Archipelago, at Bow Island and Tahiti, the rise is only 1 foot, and at the Sandwich Islands 2 feet. It is only when, by the proximity of a mainland diminishing the depth of the water, or by any similar cause the natural course of the wave is changed, or obstacles to its progress are interposed, that an accumulation takes place, and high tides are formed. In the Pacific, however, these never attain the maximum heights for which some parts of the Atlantic and Indian Oceans are celebrated. In the solitary instance of Cook's Inlet, Alaska Territory, the rise is as high as 28 feet; but on all the west coast of America it is usually below 10 feet, and only in the Bay of Panama varies from 13 feet to 15 feet.

The prevailing winds of the Pacific, like those of other great seas, are divided into regular or trade winds and variables. The trade winds of the Pacific are not so regular in their limits as those of the Atlantic, and this irregularity extends over a much wider region in the case of the southeast trade wind than in the case of the northeast. The cause of this is the greater number of islands in the South Pacific Ocean, which, especially in the hot season, disturb the uniformity of atmospheric pressure by local condensations. The northeast trade wind remains the whole year through within the northern hemisphere. In the middle of summer (about July) the zone within which it blows extends from about the Mariana or Ladrone Islands, in 145° east longitude, to near the

## PACIFIC RAILROADS — PACKARD

coast of North America (Lower California), and its southern limit begins to the south of the islands mentioned, in about latitude  $13^{\circ}$  north, gradually descends toward the east to about  $8^{\circ}$  north, and then rapidly rises again to about  $20^{\circ}$  north, near longitude  $115^{\circ}$  west. In winter (about January) this zone extends from Borneo and the Philippine Islands to the American coast; and its southern limit, beginning about the northeast of Borneo, keeps between  $2^{\circ}$  and  $4^{\circ}$  north latitude until about longitude  $170^{\circ}$  west, when it gradually rises to about  $10^{\circ}$  north latitude, at about  $100^{\circ}$  west longitude. The southeast trade wind, on the other hand, advances beyond the equator, both in summer and winter, still preserving its original direction; in summer (July) to about  $7^{\circ}$  or  $8^{\circ}$  north latitude, and in winter (January) to about  $5^{\circ}$  north latitude, at  $160^{\circ}$  west longitude. In July the zone of this trade wind extends from New Guinea and Australia to the neighborhood of the South American coast; and its southern limit, beginning off the coast of Australia, about latitude  $24^{\circ}$  south, gradually rises to about latitude  $16^{\circ}$  south, at longitude  $130^{\circ}$  west, and then sinks again to about latitude  $24^{\circ}$  south, off the coast of South America. In January, on the other hand, the western limit of the southeast trade wind is about longitude  $175^{\circ}$  west; and its southern limit, commencing there about the equator, sinks gradually till it touches the Marquesas Islands, and then more rapidly till it reaches about  $33^{\circ}$  south latitude, off the South American coast. In the region lying to the west of this zone, and stretching from New Guinea and the Solomon Islands southeastward, there are no regular winds. West winds, accompanied by rains, here alternate with calms. Sometimes also irregular warm, moist winds reach this region from the north, but the regular northeast trade wind never visits it. The zones of the two trade winds are separated by regions of calms and of light winds, the limits of which vary of course with the varying limits of these zones. In the Chinese seas the terrible typhoon occasionally rages, and may occur at any season of the year.

The following table exhibits the mean velocity of the currents of the Pacific Ocean in 24 hours:

SOUTH PACIFIC OCEAN	
Southern equatorial current.....	24 miles.
Cross current .....	20 "
Current of Cape Horn.....	18 "
Humboldt's current .....	15 "
Current of Mentor .....	16 "
General current of Australia.....	12 "
Periodical currents of Australia {	6 miles near the land.
	16 miles at sea.
NORTH PACIFIC OCEAN	
Northern equatorial current.....	30 miles.
Equatorial counter current.....	15 "
Monsoon current of the Carolines.....	3 "
Japan current .....	31 "
Current of N. W. coast of America.....	16 "
Current of Kamchatka .....	8 "
Bering's current .....	14 "

The periodical current of the west coast of Mexico, occasioned by the monsoons of this coast, resembles them in its alternations. It extends from Cape Corrientes to the Cocos Islands, preserving a nearly uniform breadth of 350 miles. It was first noticed by Humboldt. See OCEAN CURRENTS.

The Portuguese were the first Europeans who entered the Pacific, which they did from

the east. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien. Magellan sailed across it from east to west in 1520-1. Drake, Tasman, Bering, Anson, Byron, Bougainville, Cook, Vancouver, Lapérouse, and others traversed it in different directions in the 17th and 18th centuries. Consult: Burney, 'Chronological History of Discoveries in the South Sea'; Colquhoun, 'Mastery of the Pacific'; Thomson and Murray, 'The Challenger Expedition' (1880-95).

**Pacific Railroads.** See RAILWAYS.

**Pacific University**, established in 1854, at Forest Grove, Ore., under the auspices of the Congregational Church. The collegiate department confers the degrees of bachelor of arts, bachelor of science, and bachelor of letters; there is also a normal course and a preparatory department. The university is coeducational. In 1910 the grounds and buildings were valued at \$85,000; the productive funds amounted to \$235,000, and the annual income was \$13,000. The library contained 10,800 volumes; the students numbered 231 and the faculty 25.

**Pacing.** See HORSE-RACING.

**Pacinian Corpuscles, or Pacinian Bodies** (also called corpuscles of Vater), elliptical concentrically striated bodies of cellular tissue, capillary vessels, a watery fluid, granular material, and epithelioid cells; first described by Filippo Pacini in 1840. Into each corpuscle runs the axis-cylinder of a nerve (probably covered by the sheath of Schwann), terminating in a bulbous enlargement, or bifurcating, each nerve-fibril has a similar terminal knob. These corpuscles are the "peripheral end-organs" of certain sensory nerves and in the human being are found chiefly in the subcutaneous tissue of the palms of the hands and the soles of the feet, but have been found also in the genital organs, the nipples, and other portions of the body.

**Pacinolo, Paccioli, or Pacimolo** (LUCAS DI BORGO), an Italian mathematician: b. Tuscany 1440; d. 1515. He was a Franciscan monk, and taught mathematics at Florence, Venice, Padua, Naples, and Rome. His chief work, 'Summa de Arithmetica, Geometria, Proportioni et Proportionalita,' is important as being the first treatise on mathematics ever printed, and as embodying the results of mathematical research up to that time. A treatise on bookkeeping (published 1495) is also attributed to Pacinolo. See FINGER NOTATION.

**Packard, pāk'ard, Alpheus Spring**, American zoologist: b. Brunswick, Maine, 19 Feb. 1839; d. Providence, R. I., 14 Feb. 1905. He was graduated from Bowdoin in 1861; and was for three years a special student under Agassiz at the Lawrence Scientific School, Harvard University. From 1865-6 he was librarian and custodian of the Boston Society of Natural History; and from 1867-78 curator, and then director, of the Peabody Academy of Science. In 1871-3 he was State entomologist of Massachusetts; from 1877-82 he was a member of the United States Entomological Commission, participating in several scientific expeditions under their charge. In 1878 he became professor of zoology and geology at Brown University. His most important contributions to science have related to the classification and anatomy

## PACKING-HOUSE REFRIGERATION

of the arthropoda, especially insects; he proposed a new classification of insects, and regrouping of the phyla of the arthropoda. As an evolutionist he is one of the founders of the Neo-Lamarckian school, to which he gave that name. His writings include: 'Guide to the Study of Insects' (1869); 'The Mammoth Cave and its Inhabitants,' with F. W. Putnam (1872); 'Our Common Insects' (1873); 'Life History of Animals' (1876); 'Half Hours with Insects' (1877); 'Injurious Insects of the West' (1877); 'Development and Anatomy of *Limulus Polyphemus*' (1885); 'Entomology for Beginners' (1888); 'Text-book of Entomology' (1898); 'Lamarck, the Founder of Evolution, his Life and Work' (1901). He was one of the founders and for 20 years editor-in-chief of the 'American Naturalist.'

**Packard, John Hooker**, American physician: b. Philadelphia 15 Aug. 1832; d. 20 May 1907. He was graduated from the University of Pennsylvania in 1850; was acting surgeon in the United States army 1861-5; and surgeon to the Episcopal Hospital, Philadelphia, 1863-84. He was also surgeon to two other hospitals in his native city, the Pennsylvania (1884-96), and the Woman's (1876-7). He published: 'Minor Surgery'; 'Lectures on Inflammation'; 'Operative Surgery'; etc.

**Packard, Silas Saddle**, American educator: b. Cummington, Mass., 28 April 1826; d. New York 10 Oct. 1898. He was educated at the Granville Academy, Ohio, and engaged in teaching at 17. He originated an admirable system of commercial training and in 1858 organized with Bryant and Stratton a business college in New York, which later became the Packard Commercial School. He founded the 'Niagara River Pilot' in 1853 and edited it until 1856, and in 1868-70 published 'Packard's Monthly.' He was president of the congress of business education at the World's Fair in 1893, and author of numerous text-books, among which are: 'The Packard Manual of Book-keeping and Correspondence'; and 'The Packard Arithmetic.'

**Packer, pāk'ér, Asa**, American capitalist: b. Groton, Conn., 20 Dec. 1806; d. Philadelphia 17 May 1879. He worked at the trade of tanning, then as apprentice to a carpenter, went to Pennsylvania in 1822, and in 1833 took charge of a boat on the Lehigh Canal, and later connected himself with coal-mining and the transportation system between Pottsville, Pa., and New York as a builder of locks and boats for the canal system. In 1844 he was a member of the Pennsylvania legislature. The Lehigh Valley Railroad was projected by him, and was completed from Mauch Chunk to Easton in 1855. As a Democrat he served two terms in Congress (1853-7). Out of the great wealth which he acquired he made many generous public gifts, the founding and endowment of Lehigh University (q.v.) being his most conspicuous benefaction.

**Packer Collegiate Institute**, a secondary schools for girls, located in Brooklyn, N. Y. It was chartered in 1853, and opened to students in November 1854; it stands on the site of the building of Brooklyn Female Academy (founded 1845), which was burned in December 1852. The work of the Institute is in four departments,

primary, preparatory, academic, and collegiate; the primary work is in two grades, the preparatory in four, and the academic and collegiate in three. Though the Institute is a high school and confers no degrees, the work of the collegiate department overlaps the first two years of a regular college course, including in its curriculum logic, first two college years of Latin and Greek, psychology, advanced physics, and calculus. On entering the academic department, a student may choose one of two courses of study, with further privilege of choosing among elective studies in the collegiate department. Students are not ordinarily permitted to take more than three regular studies at a time. The Institute has a library numbering over 8,000 volumes (in 1903), well-equipped science laboratories, and a gymnasium in which instruction in physical training is given. It is not endowed; the Alumnae Association (organized 1886) in 1902-3 began the attempt to raise a \$100,000 fund for a new building to adjoin the original building. The students number more than 700. Of these the great majority in all departments were from Brooklyn, as no attempt is ever made to attract students from outside the city. The Institute has long ranked among the first of the schools of its grade, and has had important influence on the educational life of Brooklyn.

**Packing-House Refrigeration.** At the present time the refrigeration of packing-houses has become in America a distinct branch in the science of artificial cooling, due to the peculiar conditions existing in a modern slaughter-house of present day capacity, and the necessity of long experience with these conditions to acquire familiarity with the varied emergencies which constantly arise.

Until within a few years refrigeration other than with natural ice has been in an experimental stage in the packing trade, on account of the belief among packers that meats could not be cooled so as to retain their moisture and fresh flavor except by the old-fashioned method. This consisted merely in the filling of great bins or boxes with blocks of ice; these boxes being built just above large rooms so constructed as to retain as much as possible of the cold air produced by the ice; hence the term "chill-room".

In this way it was possible by the addition of salt to the ice to secure and maintain a temperature of from 38° Fahrenheit to 34° at the lowest, the operation, however, being slow and tedious because of the time required for the ice to be effective and the necessity of the daily refilling of the boxes. The expense in labor and the large amount of valuable space taken up, together with the knowledge of results obtained by ammonia refrigeration in other industries, however, finally induced a few in the trade to make a trial of the mechanical process.

The first to be used was what is known as the open pan brine system. This consists of a large, well-insulated wood or iron tank filled with brine and located in the same room with the ammonia compressor. Through this brine tank are run banks or "nests" of pipe coils directly connected to the compressor, thus cooling the brine by the evaporation of ammonia in these coils. The brine is circulated through the rooms to be cooled by means of a pump along a series of open pans arranged on the ceiling or



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walls, whichever is most convenient, where the heat is absorbed. Thence the liquid is returned to the tank again to be cooled and forced over the same course. This method gave very good results and it was claimed by its advocates that in addition it carried off the foul gases and tended to purify the air in the rooms. The pans, however, being cumbersome and difficult to keep in order were discarded and replaced by coils of pipe.

Since that time a number of different methods have been used, the open pan and the pipe coil systems already mentioned; the perforated coil system where the brine produces a shower in the cooling room; the sheet system where the brine flows over sheets suspended from the ceiling; the air-cooling system in which the air is brought into contact with the surface of the pipes which are cooled by brine or direct ammonia expansion, the warm air being exhausted from the room by a blower which forces it through the cooling coils and back to the rooms to be cooled, and the direct expansion system which is in most general use to-day.

By this last method the ammonia is expanded in coils arranged in the rooms, and instead of being piped to a tank of brine as formerly is carried in pipe coils directly through the various rooms to be cooled. This does away with the brine tank and pump, produces a lower temperature in the coils and distributes the cold to just the points where it is wanted with practically no loss from radiation, while in the brine system the tank is exposed to the surrounding temperature and absorbs much heat which is a total loss. In addition the brine passing through all the coils in the building produces a considerable amount of friction and the action of the salt on the coils makes them short lived. It has been demonstrated from actual tests that the direct expansion system is from 18 to 20 per cent. more efficient than the brine system. Objections have been raised to the process, such as danger of ammonia leakage which would destroy or damage the goods stored by the absorption of ammonia, but with the proper arrangement of piping this danger is very slight.

An admirable arrangement of cooling coils in beef and hog chillrooms, often used, is made by building a special room over the chillroom which is usually termed "coil loft" with suitable air ducts for proper circulation and for conveying off the hot gases.

In very small packing-houses the brine system is still preferred by some as a large quantity of brine can be cooled during the day and circulated through the rooms at night without the necessity of operating the compressor continuously, but for large plants the direct expansion process has everything in its favor; lower first cost, lower expense of maintenance, and greater efficiency.

The temperatures of curing cellars and ware houses are kept at from 38° to 40° Fahrenheit. In the chillrooms the temperatures customarily used are as follows:

For the first 12 hours after the warm carcasses are brought in 38° or 36° at the least, for the next 12 hours it is brought down to 32° and in 36 hours from the time the animals are killed it is brought down to 28 to 30° Fahrenheit

and the meat can then be cut and sent to the curing cellars. See REFRIGERATION and REFRIGERATING MACHINERY; MEAT PACKING; PACKING INDUSTRY.

JOHN WISEHART,  
*Refrigerating Engineer, Chicago, Ill.*

**Packing Industry.** The process of converting live stock into food for human consumption is an industry which within the last 50 years has assumed enormous proportions, and the development of the industry has been almost phenomenal. Hogs and sheep were raised in this country as early as 1609 in the English colony at Jamestown; by 1649 the number had increased to 20,000 in the whole country; and from that time cattle raising rapidly became a profitable trade.

The packing industry not only includes the curing and packing of hog products, but also the slaughtering, dressing and shipping of cattle and sheep. Probably the first pork packed in the United States was packed in Salem, Mass., in 1640. In 1678, 400 cattle were killed in New York, and in 1694 the number had reached 4,000. Though Boston did a considerable amount of packing as early as 1690, the slaughtering and packing of meat as a distinct industry dates back to 1818, when one Elish Mills is reported as conducting packing operations in Cincinnati. Slaughtering operations began at Chicago as early as 1823, but the packing industry was not begun till 1827, and it was not for a number of years that Chicago gained prominence as a packing centre. In 1832-33 there were several factories established at Cincinnati, where thousands of hogs were packed. The development of the agricultural resources of the Ohio Valley and the increased facilities for stock raising naturally caused the inauguration of packing operations, and numerous factories were established all over the central section of the country. As Cincinnati was located in the heart of this district, and as an ample supply of salt, one of the necessities of the trade, could be readily obtained there, the city soon became the chief centre of the packing industry. The 'Price-Current' of November, 1844, said: "The number of regular packing houses at Cincinnati is found to be twenty-six, the most of them prepared to do a pretty extensive business, as far as the necessary conveniences are concerned, but only a small portion of them will pack to any considerable extent on their own account." By 1853-4 the number had increased to 41, and in 1855-6 to 42. Previous to 1844 a large packing plant had been established at Louisville, Ky., and soon others were established at Columbus, Chillicothe, Circleville and Hamilton, in Ohio; Lafayette, Lawrenceburg, Madison, Terre Haute, and Vincennes, in Indiana; Alton, Beardstown, Pekin, Peoria and Quincy, in Illinois; and at many other places through this section of the country. These plants rapidly increased till the number reported as being engaged in the hog packing business in 1873-4 was 397, but the concentration in large centres, and the merging of the smaller plants under one management, gradually reduced the number till in 1899-1900 it had reached 53.

The statistics for the combined slaughtering

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and meat packing industry, as reported in the census of 1905, are as follows:

	1905	1890
Number of establishments..	929	1,118
Capital.....	\$237,714,690	\$116,887,504
Salaried officials, clerks, etc.	12,019	3,971
Salaries.....	\$13,343,902	\$4,536,600
Wage-earners.....	74,134	43,975
Wages.....	\$40,326,972	\$24,304,976
Miscellaneous expenses.....	\$30,631,359	\$15,716,735
Cost of material used.....	\$805,856,064	\$480,962,211
Value of product.....	\$913,914,624	\$561,611,668

The number of hogs packed in the West first passed the million mark in the season of 1843-4, but did not again reach this number till four years later, in 1847-8. Prior to the inauguration of summer slaughtering and packing in 1872, and between the years 1843 and 1872, there were 64,541,000 hogs packed in western establishments. By decades this number is divided as follows: 1842-52, 11,913,000 hogs were packed, an annual average of 1,913,000, and the largest total, 1,710,000, in 1847; 1852-62, 23,244,000, averaging 2,324,400 per year, and 2,893,000 as the largest total in 1861; 1862-72, 29,384,000, averaging annually 2,934,000, and 1871-2 the largest year with a total of 4,831,000 hogs packed.

Up to 1872, in the pork-packing branch of the industry, summer slaughtering and packing had not assumed large proportions, but in that year 505,000 hogs were killed during the summer season. This number steadily increased until the summer season of 1879-80 when it reached the enormous total of 4,051,248, an increase of 701.6 per cent. During the same period, winter packing grew from 5,410,314 hogs in 1872-3 to 6,950,451 hogs in 1879-80, an increase of 28.5 per cent. The development of the industry by decades since the summer and winter operations were instituted, is as follows: From 1872-80, a total of 63,668,000 hogs, with 1879 as the highest year, in which 10,858,000 were packed; from 1880-90 the number aggregated 111,061,000, the largest total, 13,545,000, being packed in 1889; from 1890-1900, a total of 152,426,000, with the season of 1898-9 as the largest, 23,624,000 being packed during that year; from 1900-10, a grand total of 231,796,488, the largest single season being 35,197,000 in 1908.

It will thus be seen that from a business of less than 1,000,000 hogs in 1845, the number of hogs packed had grown to about 30,000,000 in 1909-10. The annual average for the decade ending 1854-5 was 1,606,000, this increased during the decade ending with 1900-10 to an annual average of 23,170,649.

During the decade prior to 1851-2, the volume of packing at Cincinnati was 27 per cent. of the total for the West, in 1848-9 the total number reaching 475,000 hogs. This lead Cincinnati continued to hold until 1861-2, when Chicago took the lead which it has since retained. The preparation of animal food products at this point has become one of the greatest commercial and industrial enterprises that has been evolved by the American people. This was due chiefly to the location of the city. Railroads penetrated the West in 1852, by 1855 several were in operation, and to-day Chicago is the centre for the

vast systems of transportation that include more than one-half of the railroad systems of the United States. In 1850-1, about 20,000 hogs were killed in Chicago; 99,000 in 1858-9; 505,000 in 1861-2; 1,225,000 in 1871-2; 4,009,000 in 1877-8; 5,752,000 in 1880-1; 6,071,000 in 1890-1; and in 1908-1909, 7,033,647. Chicago also had the largest yearly total for one city in the history of the industry, that of 1907-8, amounting to 8,660,721, Kansas City ranking second with 3,715,109 in the same year. Chicago packed about 35 per cent. (\$8,000,000) of the total number of hogs handled by western packers during the years 1890-1900, and for slaughtering and packing in general the percentage was about the same, the city's contribution of goods valued at \$248,811,997 being 35.6 per cent. of the total for the entire country, \$698,206,548. This amount in 1900 had increased to \$256,527,949.

While these operations were being carried on in the West, the industry was by no means lagging in the East, though the eastern packing house was not established till long after the industry had gained headway in the West. It is not, however, carried on to the same enormous extent as it is in the West. In 1884 there were sold in Boston, 43,530 cattle, 98,820 sheep, and 43,530 hogs, a total of 185,410 animals; in New York 138,193 animals were sold, comprising 49,002 cattle, 75,713 sheep, and 13,478 hogs; the Philadelphia sales amounted to 37,420 cattle, 91,480 sheep, and 22,480 hogs, in all 151,380 animals; and in Baltimore 33,500 cattle, 90,450 sheep, and 24,000 hogs, a total of 147,950 animals. The aggregate value of the total number of animals sold, 622,933, was \$7,500,000. By 1899 these sales had increased over 14-fold. At the same centres the following sales were recorded in that year: Boston, 189,107 cattle, 374,785 sheep, and 1,680,834 hogs, total, 2,244,726; New York, 955,463 cattle, 1,883,081 sheep, and 1,735,215 hogs, in all 4,573,759; Philadelphia, 123,810 cattle, 363,449 sheep, and 311,869 hogs, or 799,128 animals; Baltimore, 157,542 cattle, 324,371 sheep, and 827,873 hogs, totaling 1,307,786. The aggregate value of the total number of animals sold in 1899, 8,927,390, was \$105,000,000, after deducting about \$30,000,000 for cattle exported. There are now more than 50 establishments located in eastern cities, the largest being at Buffalo, Boston, Providence, New Haven and Springfield, the total value of the products of all these for the year 1900 being about \$60,000,000.

Prior to 1860 beef packing was not attempted on a large scale, though barrelled beef was put up in considerable quantities in the West as early as pork, and shipped from eastern cities all over the world. The development in the packing of beef on a large scale has been due to the adoption of improved methods of artificial refrigeration; and the discovery of a practical method of hermetically sealing tin cans rendered possible the preservation of food in this manner on a large scale. The invention of the refrigerator car by William Davis, of Detroit, in 1868, was one of the most important steps in the development of the industry. The adoption of this car made it possible to slaughter cattle in the West, and ship the product to the East, without fear of deterioration or putrefaction. The first cargo of fresh beef was shipped in September, 1869, from Chicago to Boston.

This marked the beginning of a large export trade both in fresh and canned beef; in 1890 the number of pounds of canned beef exported amounted to 82,638,507, but this amount was reduced in 1900 to 55,553,745. The production of canned beef has also shown a decline from 123,428,456 pounds in 1890, to 123,219,021 pounds in 1900. The exports of fresh beef, however, show a steady advance from 19,838,000 pounds in 1876, to 100,622,000 pounds in 1880. For the 10 years ending with 1889 the annual average was 113,000,000 pounds, the greatest amount, 182,500,000 pounds, being shipped in the last year of the period. During the period ending with 1899 the annual average was 233,000,000 pounds, reaching the high-water mark of 323,000,000 pounds in 1899.

The main points in the West where the killing of cattle for commercial supplies has been prosecuted are Chicago, Saint Louis, Kansas City, Omaha, South Saint Joseph, Milwaukee, Sioux City, Indianapolis, Cincinnati and Cleveland, and the most important eastern points are Boston, New York, Baltimore and Philadelphia. The statistics for the number of cattle killed throughout the country for packing purposes are meagre. At Chicago, Saint Louis, Kansas City and Omaha, 3,786,000 cattle were killed in 1899, and in the same year, at the eastern markets, 1,425,000 were killed, making a total of 5,211,000, the approximate value of which was \$280,000,000. The mutton trade has also assumed important proportions, in 1899 the number of sheep killed in western markets was 5,019,000; in the eastern, 2,945,000.

The production of hams in 1900 amounted to 787,526,973 pounds, the value of which was \$73,793,012; the production of smoked bacon, sides, and shoulder was 985,722,212 pounds, valued at \$74,873,847, an increase in pounds of 48 per cent. and in value of 67.6 per cent. over the production of 1890. The amount of sausage, fresh and cured, almost doubled in quantity during the decade from 1890 to 1900, the total production in the latter year being 292,164,075 pounds, with an aggregate value of \$21,472,412. Refined and neutral lard to the amount of 891,438,417 pounds valued at \$52,620,348, and 129,345,283 pounds valued at \$8,588,350 respectively, were produced in 1900, showing to what a large extent the carcass was used for other purposes than previously. Besides these there were produced 19,111,120 gallons of oleomargarine oil valued at \$11,482,542; 8,245,569 gallons of other oils aggregating in value \$3,440,358; 168,510 tons of fertilizer, valued at \$3,300,132; 6,281,952 hides, weighing 336,527,907 pounds, and valued at \$3,925,911; 13,182,146 pounds of wool, valued at \$3,385,824. This product of 13,182,146 pounds of pulled wool amounted to 35.6 per cent. of the 37,000,000 pounds of pulled wool produced in the United States during the year 1900, according to the estimates of the National Association of Wool Manufacturers. These statistics show the enormous proportions to which the packing industry has grown since its inception about 80 years ago, due largely to labor-saving devices and artificial refrigeration.

Until a few years ago the waste products of the abattoir were not utilized, but after the packing industry had grown to fairly large propor-

tions, subsidiary enterprises were established in the vicinity of the slaughtering establishments. From the horns, hoofs, bones, sinews, hide trimmings, and other waste materials, are now made glue, gelatin, brewers' isinglass, curled hair, bristles, wool felt, hair felt, laundry soap, soap powders, toilet soaps, glycerin, anhydrous ammonia, fertilizers, pepsin, knife handles, etc. The sweet fat of the cattle forms the basis of butterine; the fat of the hog is made into lard, and the intestines are cleaned, salted and used for sausage casings; and the pelts of the sheep, with the wool, are scoured and sold to the large cloth mills. A large number of establishments have chemical laboratories, where expert chemists are constantly seeking new combinations which will render the by-products more valuable. For the various methods of curing and packing meats consult MEAT PACKING; also see MEATS AND MEAT PRODUCTION; LIVE STOCK; PACKING HOUSE REFRIGERATION; REFRIGERATION AND REFRIGERATING MACHINERY.

**Pa'co**, a name of the alpaca (q.v.).

**Pactolus**, pāk-tō'lūs, Asia Minor, the classic name for the modern SARABAT, a Lydian stream anciently celebrated for its golden sand, the reputed source of the wealth of Cræsus. It rises on the north side of Mount Tmolus, flows past Sardis, and has its outlet in the Hermus.

**Pacuvius**, pa-kū'vī-ūs, **Marcus**, Roman tragic poet, nephew of the poet Ennius: b. Brundisium about 220 B.C.; d. Tarentum about 130 B.C. He was a student under Ennius, and not only a poet but a painter as well, as is shown by the many allusions to a picture of Hercules in Forum Boarium. Most of his tragedies followed Greek models; such were the 'Antiope' and the 'Dulorestes,' the latter being adapted from Euripides' 'Iphigenia in Tauris'; among native plays by him, the one most often mentioned is the 'Paullus,' written in honor of Lucius Æmilius Paullus. He also wrote satires, but of this great body of work nothing but a few quotations by grammarians and rhetoricians has come down to us; these are edited by Ribbeck in 'Scænicæ Romanorum Poesis Fragmenta' (1897). Consult: Müller, 'De Pacuvii Fabulis' (1890).

**Padang**, pā-dāng', Sumatra, Dutch residency or province on the west coast of the island; also the province's capital city, on the right bank and mouth of the Aran River, which is very shallow at its embouchure and so makes a poor harbor. The city has government workshops and barracks, schools, hospitals, and churches; and was the earliest Dutch city in Sumatra (1666). It does business with the interior of the island by rail and exported in 1900: nutmegs 2,569 piculs (picul = 133½ lbs.); coffee, 13,537 piculs; cinnamon, 5,775 piculs; rattan, 31,058; copra, 53,889; tobacco, 10,514; gum, 9,836; and 20,076 hides. The city has a European and a Chinese quarter, in which there are a few stone houses; elsewhere bamboo is used. The climate is temperate and healthy; the temperature averages 25° C. for the year and rarely goes above 32° or below 20°. The city has several consulates, one American. Pop. about 12,000; the residency between 1,000,000 and 1,600,000.

## PADDLE—PADIHAM

**Paddle**, a wooden implement consisting of a wide, flat blade with a short handle, by means of which a small boat or raft is propelled, the operator spooning the water toward him. In canoes a double-headed paddle is used, being dipped alternately on either side. Among barbarous nations the paddle is still in use as a substitute for the oar.

**Paddle-fish, Spoon-bill Cat, or Spade-fish**, a singular fish (*Polyodon spathula*) of the sturgeon tribe, *Chondroganoidea* or *Chondrostei* (q.v.), which takes its name from the extraordinary spatulate prolongation of the nasal bones and upper jaws into a thin, spade-like, mud-digging instrument, measuring a third to a quarter of the total length of the fish. It abounds in the more sluggish parts of the rivers of the Mississippi Valley and of the Southern States, and occasionally reaches a length of more than six feet and 75 to 100 pounds in weight. In general form it resembles a sturgeon, but the skin is destitute of plates or scales, except on the upper lobe of the tail, and is a dull greenish mud-color in hue. The gill-apertures are of large size, and the gill-covers are prolonged backward nearly to the middle of the body. The mouth is large, and provided with teeth in the young, but they disappear as the fish grows older.

The paddle-fishes "feed chiefly on mud and minute organisms contained, stirring it up with the spatulate snout." Their spawning habits are little known, but apparently the eggs are voided as soon as the water where each fish lives reaches a fair degree of warmth; at this time they ascend the streams and bayous, swimming near the surface, and are caught by means of seines. At other seasons they may be caught on set-lines. Formerly the flesh, which resembles that of the sturgeon, was eaten only by the southern negroes, but now it finds a sale in many local markets, and is frequently smoked and sold for sturgeon. The greenish black roe is also coming into demand for the making of caviar. Another closely related form (*Psephurus gladius*) lives in Chinese rivers, and the two species constitute the family *Polyodontidae*, fossil remains of which are found in Wyoming as far back as the Eocene. Consult: Jordan and Evermann, 'American Food and Game Fishes' (1902), and other authorities therein cited.

**Paddock**, pād'ók, **Algernon Sidney**, American lawyer and politician: b. Glens Falls, N. Y., 9 Nov. 1830; d. Beatrice, Neb., 17 Oct. 1897. He studied law, and removing to Nebraska in 1857 was admitted to the bar there, and became prominent in the political life of the Territory. In 1859 he was delegate to the Territorial Republican Convention, and in 1860 and 1864 to the National Republican Convention. In 1861 he was appointed secretary of the Territory, holding this position till 1867 when Nebraska was admitted to the Union, for a part of this time acting as governor. In 1868 he declined an appointment as governor of Wyoming Territory. In 1875 he was elected to the United States Senate and again in 1887, while between his two terms in the Senate he was for four years a member of the Utah Commission. While in the Senate he was a member of several important committees, including the committee on

pensions, on public lands, on post-offices and on public buildings, and during his last term was chairman of the committee on agriculture and forestry.

**Paddy-bird**, the name among English-speaking persons in the East for various birds frequenting rice fields, especially small white egrets of several kinds; also a finch, the Java sparrow (q.v.).

**Padel'la** (Italian, from Latin *patella*, a small flat dish), a shallow vessel used in illuminations. A number of them are partially filled with oil or grease, in the middle of which is placed a wick, and are then placed so as to bring out when lighted the outlines of a building or the slope of a rising ground. The idea originated in Italy.

**Pad'emelon**, a small, naked-nosed kangaroo of the genus *Halmaturus*, specifically *H. thetidis*, or New South Wales. It inhabits brushy districts, and with others of its race in Australia and Tasmania is hunted for the sake of its hide.

**Paderborn**, pā'dër-börn, Germany, a town and episcopal see in the Prussian province of Westphalia, at the sources of the Pader, 50 miles southeast of Münster. It is an old town, with narrow streets, and antique houses. It has a fine recently restored cathedral, with a tall and massive tower which, as well as the crypt, belongs to the 11th century—both in the Romanesque style; while the body of the church, 345 feet long, is of the 13th century. It has also a fine market place, an ancient town-house, and several other ancient churches and chapels. The industries include letterpress-printing, flour, soap, glass, beer, and tobacco. The ground on which it stands teems with mineral springs. The university which existed at this place from 1614 was suppressed in 1819. Pop. about 27,000, mostly Roman Catholics.

**Paderewski**, pā-dě-rěf'skē, **Ignace Jan**, Polish pianist: b. Podolia, Russian Poland, 6 Nov. 1860. He began serious study of the pianoforte in 1867, continued his preparation from 1872 at Warsaw under Kiel and Roguski, toured Russia, Siberia, and Rumania, and became a professor in 1878 in the Warsaw conservatory, in 1884 in that of Strasburg. After further study with Leschetizky in Vienna, he made his formal appearance as a concert pianist in 1887. He played in London in 1890, and in 1892 in the United States, which he has frequently revisited. He became the best-known pianist of his time, distinguished alike for his technique and his intellectual interpretation. In 1902 he conducted in the United States his opera 'Manru,' which achieved a great success. His interest in American music was shown by his placing in the care of trustees the sum of \$10,000 for the encouragement of the composers of the United States. His compositions are largely for the pianoforte, and include 'Elégie, op. 4'; 'Danses Polonaises'; 'Chants du Voyageur'; 'Minuet'; 'Dans le Désert'; and 'Humoresques de Concert.'

**Padiham**, England, a town of Lancashire, on the Calder, a northeast suburb of Accrington. It is an industrial centre with cotton mills, coal mines, and stone quarries. Pop. about 12,200.

**Padilla, Juan Lopez de**, hoo-ān' lō'pāth dā pā-thēl'yā, Spanish warrior: b. Toledo 1484; d. 24 April 1521. At the outbreak of the insurrection of the Castilian towns the Santa Junta entrusted him with the command of the forces of the comuneros. After several successes his force was defeated by the royal army at Villalar 23 April 1521. He himself was wounded and taken prisoner, and executed on the following day. The two letters in which, shortly before his execution, he took leave of the town of Toledo and of his wife Maria Pacheco, were known in Spain as models of magnanimous feeling and touching simplicity. Both he and his widow, who defended Toledo for some time after his death, have become the subject of numerous dramas and poems.

**Padilla**, Bolivia, capital city of the province of Tomina and department of Chuquisaca, 90 miles northeast of Potosi. Originally called Laguna, the city now bears the name of Manuel Asencio Padilla, a patriot of this province, killed at Villar, 14 Sept. 1816. Pop. about 6,000.

**Pa'dishah**, in Persia, a title assumed by or applied to the Turkish sultan, derived from *pad*, *padi* (protector or throne), and *shah* (king, prince).

**Padua**, pād'ū-a, or **Padova**, pā'dō-vā, Italy, a university city, capital of the province of the same name, 22 miles west of Venice, on the Bacchiglione. It is surrounded by a lofty wall flanked with bastions, and is entered by seven gates. It is connected by canals with the Adige and the lagoons of the Adriatic. The streets and squares are usually lined with colonnades. The largest and finest of the piazzas is the Piazza Vittorio Emanuele, formerly called the Prato della Valle, which is planted with trees, surrounded by a running stream, and adorned with numerous statues of distinguished townsmen and other Italians. The principal buildings are the town-house or Palazzo della Ragione, an immense pile extending along the market place, erected between 1172 and 1219, and remodeled in 1420, standing upon open arches, and containing a large hall adorned with fine mural paintings, about 400 in number; the late Renaissance Duomo or cathedral, built in the 16th century, possessing a fine library, rich in rare books and manuscripts, and of which Petrarch, who was canon of the cathedral, is reckoned one of the founders; the baptistery of the cathedral, a fine Lombard building of the 12th century, its walls and cupola entirely covered with frescoes; and the Church of St. Anthony. The most famous establishment in Padua is the university, one of the most ancient in Europe, said to have been founded early in the 13th century by Emperor Frederick II., but according to other accounts not founded till 1260, and sanctioned by Pope Urban IV. in 1263. It was long renowned as the chief seat of law and medicine, and is celebrated for its long list of notable professors, including Galileo, Guglielmini, and Fallopius, and for its students, including Dante, Petrarch, and Tasso. In 1902 it had over 1,400 students. In connection with the university is a botanic garden, the oldest in Europe, containing some of the earliest specimens of trees and plants once rare, but now generally diffused; a library of 140,000 volumes, and an observatory. The manufactures include silk fabrics,

ribbons, catgut, chemicals, machinery, automobiles, etc., and like the trade in cereals, oils, wines, and cattle, are increasing. Padua is the see of a bishop and the seat of several superior courts and public offices. It claims to have been founded shortly after the destruction of Troy by the Trojan Antenor. Under the Romans it became a flourishing municipal town, but on the decline of the empire was sacked, first by Alaric and then by Attila. Its great modern restorer was Charlemagne, under whose successors it successfully asserted its independence. In 1318 it fell under the domination of the Carrara family, and in 1405 under that of Venice, whose fortunes it has since followed. Among the distinguished men to whom Padua has given birth are the historian Livy, Sperone Speroni, a writer of tragedies in the 16th century; Mantegna; the poet Cesarotti.

**Paducah**, pa-dū'ka, Ky., city, county-seat of McCracken County; at the confluence of the Tennessee and Ohio rivers, and on the Nashville, C. & St. L. and the Illinois C. R.R.'s; about 35 miles in direct line east by north of Cairo, Ill., and 80 miles southwest of Evansville, Ind. It has steamer connection with Mississippi, Ohio, and Tennessee river ports. It was settled in 1821 by James and William Pore, and was incorporated 11 Jan. 1830. During the Civil War the city was occupied by General Grant in September 1861. It is in a productive agricultural region; in the vicinity are forests of hard and soft wood, and deposits of fire-clay, glass, sand zinc, and fluor spar; limonite is found within 30 miles, and coal, in rich veins, within 60 miles. It has extensive manufacturing interests; the chief manufactures are pig iron, lumber, veneering, building material, spokes, rims, staves, headings, barrels, curtain poles, furniture, stoneware, pottery, saddles, collars, harnesses, tobacco products, knit goods, canned goods, brooms, brick, proprietary medicines, beer, and flour. It has a large ore milling plant and novelty works, in all 51 manufactories giving employment to about 3,000 persons, and the two railroads employ about 1,200. There is an extensive wholesale trade in clothing and food products, and in its own manufactures. The prominent public buildings are the United States government building, municipal buildings, churches, and schools. The educational institutions are Saint Mary's Academy, a high school, public and parish schools, and a number of private schools. There are 23 churches. The six banks have a combined capital of \$1,350,000; the bank clearings are annually about \$50,000,000. The government is administered under a charter of 1893, which provides for a mayor, who holds office four years, a board of aldermen, eight in number, chosen each four years, and 12 councilmen chosen each two years. The city owns and operate the electric light plant. Pop. (1910) 22,760.

GEO. H. DAINS,  
*Secretary of The Commercial and Manufactures Association.*

**Pæ'an**, a hymn sung in honor of Apollo. In the hymns to Apollo the phrase *Io pæan* was frequently repeated, and hence they were also called *pæans*. They were sung in time of sickness, and on other occasions, when it was desirable to propitiate the favor of the god. Hymns to other deities, or songs in praise of heroes,

were at a later period likewise called *pæans*. A *pæan* was sung, previous to battle, in honor of Mars and after a victory, in praise of Apollo.

**Pædogen'esis**, the reproduction of animals while in the immature or larval stage. Thus certain salamanders (*Amblystoma*) produce eggs which develop into adults when the parents still retain the gills and are aquatic in their habits. More strictly pædogenesis is applied to parthenogenesis (q.v.) in the larval stage. Best known instances are certain flies (*Miasor*), where the larvæ produce eggs which develop, without fertilization, inside the body and these finally escape by eating their way out, the parent being destroyed as a consequence.

**Paër, pâ-är', Fernando**, Italian composer: b. Parma, Italy, 1 June 1771; d. Paris, France, 3 May 1839. He was educated in Venice, summoned to the court of Vienna in 1795, and in 1801-7 was chapel-master at Dresden. After the battle of Jena he was attached to Napoleon's court, where he was imperial composer; in 1812-27 he directed the Italian grand opera at Paris and in 1831 was elected to the Academy. His work is rich in melody and his greatness as an Italian composer is unquestioned, yet of his voluminous work little is remembered. His best known operas are 'Griselda' (1796); 'Camilla' (1801); 'Agnese' (1819).

**Pæstum, pës'tüm**, ancient Greek city of Southern Italy on the west coast of Lucania and the present Gulf of Salerno (in ancient times *Sinus Pæstanus*). Founded as early as the beginning of the 6th century B.C. as a colony of Sybaris under the name of Posidonia (that is, "sacred to Poseidon," or Neptune), and reaching great prosperity in the next century and a half, the city was conquered by the Samnites of Lucania, who probably Italianized its name into Pæstum. It did not regain its old position even when two centuries later (273) it became a Roman colony, but is famed in Roman poetry for its roses. It was devastated in the 9th century by the victorious Saracens, and in the 11th by Robert Guiscard. The poor village of Pesto, a railway station, now occupies the site, which has, however, two remarkable Doric temples, one to Poseidon, the tutelar god, and one to Demeter. Consult: Labrousse, 'Les Temples de Pæstum' (1877).

**Pætus, Cæcinnæ, pët'üs**. See **ARRIA**.

**Pæz, Jose Antonio, hō-sä' än-tō'nē-ō** pā'äth, Venezuelan patriot and soldier: b. Araure 13 June 1790; d. New York 7 May 1873. He was of native stock and with a body of llaneros, trained like himself as herdsmen, about 1810 joined the patriot army, in which he became division commander in 1819. He administered a severe defeat to the Spaniards in 1821 and in 1823 captured their last port, Puerto Caballo. Jealous of his successor in 1826 he attempted rebellion but was conciliated by Bolivar, who made him military and civil chief of Venezuela, thus paving the way for the war of Venezuelan independence in which Pæz was the prime mover. In 1831-5 he was president of the new republic, and held the same office 1839-43 after acting as commander-in-chief during Vargas' administration and putting down two serious rebellions. In 1846 he was appointed dictator during the race war; in 1848 refused the presidency; in 1848 headed a rebellion against Mon-

gas, but was defeated and imprisoned for several months; spent eight years in banishment; returned to Venezuela in 1858; was minister to the United States in 1860; became commander of the army in 1861; and was again driven into exile in 1863 by a revolution against his lieutenants, to whom he had entrusted large powers. The Federalist party was successful and Pæz, leader of the Centralists, passed the remainder of his life in New York. Consult his 'Autobiografia' (1867).

**Pagan, pä-gän'**, India, a town of Upper Burma, on the east bank of the Irawady, 90 miles southwest of Mandalay. Pagan was founded in 847 A.D., and was the capital of Burma until 1284, when it was abandoned during a Chinese invasion. The remains of Buddhist temples and pagodas cover an extensive area, and are of great archaeological interest. Some of them are still occupied by priests, and the town has a population of about 8,000, chiefly Buddhists.

**Paganini, pä-gä-në'në, Niccolo**, Italian violinist: b. Genoa 27 Oct. 1782; d. Nice 27 May 1840. His father discerning the talents of his son, put him at an early age under the best masters to learn the violin. With this instrument he was able to perform in public at the age of nine. In his 12th year he went to Parma, where he was taught counterpoint by Rolla (see **ROLLA, ALESSANDRO**) and Ghiretti. In 1797 he performed in the cities of Lombardy and afterward in the principal cities of all of Italy. He settled at Lucca, in 1805, where he was appointed principal violinist to the court chapel. In 1808 he left Lucca, and for five years lived an obscure and rambling life in Italy. In 1813 he reappeared before the world, and performed at Milan. He remained in Italy till 1828, suddenly appearing, and, after exciting unbounded enthusiasm by his public performances, as suddenly departing. In the year mentioned he visited Austria and Germany, appearing first in Vienna. The wonder which he excited was caused not merely by his extraordinary skill, but also by his personal appearance, which had something weird and even demoniacal in it. His imitation of the flageolet, and his rendering of whole pieces on the G string, were particularly applauded. The emperor of Austria appointed him his chamber virtuoso, and the king of Prussia his director of music. After visiting the great towns of Germany he proceeded to France and Great Britain. In Paris he produced an unprecedented sensation, and, as in Germany, made immense gains. He was equally successful on the other side of the Channel. He returned in 1834 to Parma, where he purchased the villa Gajona. Among his compositions, one of the most celebrated is the 'Carnival of Venice.'

**Pagans** (Lat. *pagani*, those who live in the villages, *pagus*), those who remained unconverted to Christianity and the worship of the true God. While the cities were the centres of Christian life the remote villages (*pagi*) were still in pagan darkness, and their inhabitants kept up the practice of idolatry and the creed of polytheism. The men of the village, pagans, among the Latin races corresponded to the men of the heath, heathens, among the Teutonic races. The term pagan is not properly applied to Jews or Mohammedans since these worship



the one God, the Jehovah, of Christians and Jews.

**Page, John**, American legislator: b. Rosewell, Va., 17 April 1744; d. Richmond, Va., 11 Oct. 1808. He was graduated from William and Mary College in 1763, where he was intimate with Thomas Jefferson. He served under Washington in an expedition against the French and Indians, and during the American Revolution acted as a member of the committee of public safety and as lieutenant-governor of the commonwealth, sacrificing to the cause of the colonies a large share of his private fortune. He served in Congress in 1789-97, and in 1802 was elected governor of Virginia. In 1805 he was appointed by President Jefferson commissioner of loans for Virginia, which position he held until his death.

**Page, John Lloyd Warden**, English author: b. Minehead, Somerset, 25 Aug. 1858. After a dozen years' practice as a solicitor he retired in order to devote himself to topographical literature. Among his published works are: 'Dartmoor and its Antiquities' (1889); 'Exmoor' (1890); 'The Rivers of Devon' (1893); 'The Coasts of Devon and Lundy Island' (1895); 'The Church Towers of Somerset,' with E. Piper (1890-1900); etc.

**Page, Thomas Jefferson**, American naval officer: b. Shelly, Gloucester County, Va., 4 Jan. 1808; d. Rome, Italy, 26 Oct. 1899. In 1853-6 he was lieutenant-commander in explorations of the La Plata region in South America, and in February 1855 his vessel was fired upon from a Paraguayan fort. Resigning in 1861 he then entered the Confederate service, was commissioned commodore and in 1862 was sent to England to take charge of a cruiser. As, however, he was prevented from taking the ship out he secured the command of a small iron-clad at Copenhagen, which was soon after seized from him while in a Spanish port. Leaving the service he subsequently resided in Argentina and in Florence, Italy. He wrote 'La Plata, the Argentine Confederation, and Paraguay' (1859).

**Page, Thomas Nelson**, American lawyer and author: b. Hanover County, Va., 23 April 1853. He was educated at Washington and Lee University, studied law for a year at the University of Virginia, was admitted to the bar, and established himself in practice at Richmond. His avocations became literature and lecturing. Perhaps no post-bellum writer has depicted with so rare a skill the negro and white life of slavery, war-time, and reconstruction. His rendering of the Virginia colored dialect in such stories as 'Marse Chan,' first printed in the 'Century' 1884; later in the collection 'In Old Virginia' (1887), assumed a real philological importance. Among his further writings are: 'Befo' de War,' poems by A. C. Gordon (1888); 'On Newfoundland River' (1891); 'Elsket' (1891); 'The Old South,' essays (1892); 'Red Rock' (1898); 'Gordon Keith' (1903).

**Page, Walter Hines**, American publisher: b. Cary, N. C., 15 Aug. 1855. He was educated at Randolph-Mason College, Va., and Johns Hopkins University, was editor of 'The Forum' 1890-5, literary advisor to Houghton, Mifflin & Co., publishers, 1895-9; and editor of 'The At-

lantic Monthly' 1896-9. Since November 1900 he has been editor of 'The World's Work' and a member of the New York publishing house of Doubleday, Page & Co.

**Page, William**, American artist: b. Albany, N. Y., 23 Jan. 1811; d. Tottenville, Staten Island, 1 Oct. 1885. He studied under James Herring and Samuel F. B. Morse, at the Academy of Design, and lived 11 years in Italy, copying the Italian masters and especially Titian. He spent much time in analyzing the methods of that master and was so successful in imitating his style and coloring that one of his pictures was seized by the Florentine authorities, as an original Titian, which was being conveyed out of the country. In 1836 he was elected a member of the National Academy, of which he was president, 1871-3. Among the portraits painted by him are those of John Quincy Adams, the Brownings, Charlotte Cushman, and others, including a full-length likeness of Admiral Farragut, which was purchased and presented to the emperor of Russia. His chief paintings are: 'The Holy Family' (1837); 'The Last Interview' (1838); 'Ruth and Naomi' (1880).

**Paget, pāj'ēt**, **Sir George Edward**, English physician: b. Great Yarmouth, Norfolk, England, 22 Dec. 1809; d. Cambridge, England, 16 Jan. 1892. He was graduated from Caius College, Cambridge, in 1831, and later studied medicine in Cambridge and in Paris. In 1872 he was appointed regius professor of physic at Cambridge, and became K. C. B. in 1885. He held high rank in his profession, and did much to advance the education of physicians.

**Paget, Sir James**, English surgeon, younger brother of Sir George Edward Paget (q.v.): b. Great Yarmouth, Norfolk, England, 11 Jan. 1814; d. London 30 Dec. 1899. He studied in St. Bartholomew's Hospital, London, became a member of the Royal College of Surgeons in 1836, and a fellow in 1843. He was consulting surgeon at St. Bartholomew's Hospital, and sergeant-surgeon to the queen, and was created a baronet in 1871. He was vice-chancellor of the University of London, president of the Royal College of Surgeons, and delivered many important lectures on his surgical work. He published: 'Lectures on Surgical Pathology' (1853); 'Clinical Lectures' (1875); etc.

**Paget, Violet** ("VERNON LEE"), English essayist and critic: b. 1856. Since 1871 she has made her home in Italy, devoting herself in the main to the study of Italian art and literature. She is a brilliant though not always a convincing writer, fluent, and discursive, and not infrequently subtle as well, and possesses the power of holding the reader's interest, no matter what subject be chosen. Among her works, all of which have appeared over the signature of "VERNON LEE," are: 'Studies of the 18th Century in Italy' (1880); 'Belcaro: Essays on Sundry Aesthetical Questions' (1882); 'Ottolie: an 18th Century Idyll' (1883); 'Euphorion,' essays (1884); 'Miss Brown,' a novel (1884); 'Juvenilia,' essays (1887); 'Renaissance Fancies and Studies' (1895); 'Limbo,' essays (1897); 'Genius Loci' (1899); 'Hortus Vitæ: Essays on the Gardening of Life' (1903).

**Pago, pā'gō**, island of the Adriatic in the bay of Quarnero and district of Zara, Dalmatia;

## PAGO-PAGO — PAIN

an Austrian possession. The canal of Morlacca separates the island from the mainland. Area, 81 square miles; pop. (1890) 6,203. The capital city, bearing the same name, lies in the deep Vallone di Pago, which is hemmed in on every side save where the Bocca di Pago gives approach; the city has important saltworks, and a population of 3,554.

**Pago-Pago.** See PANGO-PANGO.

**Pago'da**, a name commonly given to the temples of the Hindus and other nations in Asia. They are built of wood and stone and adorned with obelisks, columns, and other architectural ornaments. Some are of great size and height. The most celebrated pagodas are those of Benares, Siam, Pegu, the Juggernaut, etc.

**Pagsán**, pāg-sān', a mountain of the Philippines, a peak of the Cordillera del Norte, on the intersection of the boundaries of Abra, Cagayan, and Ilocos Norte provinces; height, 7,330 feet. At Pagsán a spur leaves the main range, which forms the boundary between Abra and Ilocos Norte. The south slopes of Pagsán are drained by the Anayan and the Calúan, which unite to form the Tinog River, a tributary of the Abra.

**Pagu'rus**, or **Paguridæ**. See HERMIT CRAB.

**Pahang**, pā-hāng', Indo-China, one of the federated Malay states under British protection, on the east coast of the Malay Peninsula, between 2° 28' and 3° 45' N. and 101° 30' and 103° 30' E., to the north of Negri Sembilan and Johor, east of Perak and Selangor, south of Kelantan and Trengganu, and west of the bordering China Sea. The state is 210 miles long, 130 wide, with 112 miles of coast and an area of 15,000 square miles. It takes its name from the Pahang River, which drains the region and is navigable for large river boats 200 miles from its source, but too shallow for commerce of importance. Pahang in ancient times was called Indrapura. It was ruled by the Siamese until the 16th century; then by refugees from Malacca, who founded a royal line, between the members of which there was bitter war in 1855-65. In 1887 a treaty was signed with the British governor of the Straits Settlements; in the following year a British resident was appointed to protect British interests, but disorder broke out again and was only quelled by the armed interference of the Straits governor; in 1895 Pahang joined the Malay Federation. The state is fertile with regular and sufficient rains, and is cooler than the western coast of the peninsula. The important industry of Pahang is gold mining; the Raub mine and other lodes along the river are successfully worked by European capital; electricity is carried to the mines seven miles by overhead wires. The state's imports in 1900 were valued at \$973,405; the exports were \$2,322,950, including \$680,000 worth of gold and a little more than 1,000 tons of tin. The population is nearly 90,000; 134 being Europeans and Americans; 73,462 Malays and aborigines of other stocks; 8,695 Chinese; and 1,227 Hindus, especially Tamils. The capital is Kuala Lipis; there are four administrative districts.

**Paharia**, or **Maler**, a northern section of the Dravidian race, inhabiting the Rajmahal Hills, Bengal, India. See **DRAVIDIANS**.

**Pahlanpur**, or **Pahlumpur**. See **PALANPUR**.

**Pahlavi** (pā'la-vē) **Language**. See **PERSIA**, **LANGUAGE AND LITERATURE**.

**Pahlen**, pā'lēn, **Peter Ludwig**, **COUNT OF**, Russian statesman; b. Palms, Esthonia, 28 April 1745. He fought in the war with Prussia 1761-2, against Turkey 1769, and against Sweden; was ambassador to Sweden 1790; was governor-general of Courland 1795, and later of Finland; was made a Russian count in 1799 and prime minister, foreign minister, and military governor of Saint Petersburg in 1800. These high offices he used to further the conspiracy against the Czar Paul I., which resulted in the assassination of that monarch in 1801. Alexander I. distrusted Pahlen and retired him. His son, **PETER** (1778-1864), a great Russian general, fought in Asia in 1796, against the French 1812-14; and in Poland in 1831. He was Russian minister to Paris from 1835 to 1841. His younger brother, **FREDERICK** (1780-1863), was minister to Prussia, to Rio Janeiro, and to Munich, a signatory of the treaty of Adrianople in 1829, and later governor of Kherson.

**Pailleron**, **Edouard Jules Henri**, ā-doo-ār zhūl ōn-rē pā-yē-rōn, French dramatist; b. Paris, France, 17 Sept. 1834; d. there 20 April 1899. He was a clerk in a notary's office until 1860, when his first work, a volume of satirical poems and a play, was published, after which he devoted himself to literature. His plays are written in both prose and verse, and have attained popularity, the later ones receiving greatest attention though really inferior to his first work. He was elected to the Académie Française in 1884 as a result of the popularity of his 'Le Monde ou l'on s'ennuie' (1883). Among his plays are: 'Le Mur mitoyen' (1861); 'L'Age Ingrat' (1879); 'La Souris' (1887); etc.

**Pain**, **Barry**, English author and journalist. He was educated at Cambridge, was for a time an army tutor, and in 1890 removed to London. He has published: 'In a Canadian Canoe' (1891); 'Playthings and Parodies' (1892); 'Stories and Interludes' (1892); 'Graeme and Cyril' (1893); 'Kindness of the Celestial' (1894); 'The Octave of Claudius' (1897); 'Wildmay and Other Stories of Women' (1898); 'Romantic History of Robin Hood' (1898); 'Eliza' (1900); 'Another English Woman's Love Letters' (1901); 'The One Before' (1902).

**Pain**, a sensation felt in animal bodies, always disagreeable and varying in degree, from a slight uneasiness to intense agony. It is a very important sign in some diseases, and is nearly always associated with an inflammation, an ulceration, or a solution of continuity in some of the tissues of the body. But in health also intense sensory stimuli, that is, beyond the individual's natural limit of stimulation, are capable of producing pain. Griesinger states that the essence of pain lies in a disturbance of the organization of the nerve at some point in its course. Tickling, if persistent, may become painful; spasmodic contractions of muscles cause severe pain; so also does intense sunlight shining into one's eyes, and high-pitched sounds, if long continued, produce painful sensations. Those parts of the body which are most sub-

ject to injury are supplied with nerves in the largest quantity.

Were it not for sensibility to pain, important parts of the body might be irreparably injured without the knowledge of the individual. This sensibility undoubtedly differs in degree in both men and animals. Persons of a highly excitable temperament usually feel pain intensely, especially if they are predisposed to neuralgia. Pain is called acute, when sharp and violent; lancinating, when of a stabbing or darting character; lacerating, when there is the sensation of tearing; burning, when it resembles the pain of a burn. Pains are also distinguished as smarting, stinging, griping, bearing-down, gnawing, biting, etc. The degree of pain is not always in proportion to the gravity of a disease, and may be masked by other symptoms in a severe affection. Extensive ulcerations may occur in the stomach and intestines, for example, attended with very little pain. Cartilage is believed never to be the seat of pain. Pain is frequently sympathetic or reflex, occurring in a portion of the body remote from the seat of disease or irritation; for example, in disease of the hip-joint pain is felt in the knee. The feeling of pain is always referred to the periphery of the sensory fibres, no matter what portion of the sensory tract has been irritated. "Lesions of the brain are rarely accompanied by sensation in that organ, but often by severe pain referred to the extremities."

While pain is but a symptom, it should, if possible, be relieved, though the cause may not be removed. Painful sensations are associated with a depression of the circulation. Pain exhausts nervous energy, interferes with sleep, interrupts the appetite and digestion, and if long continued may shorten life. For treatment, remove the cause, enjoin rest, apply locally hot water or poultices, sinapisms, counter-irritation, and anodyne liniments. Anodyne or narcotic drugs, although of value, should be used cautiously. Regulation of the diet and attention to the condition of the bowels is important.

**Paine, Albert Bigelow**, American author: b. New Bedford, Mass., 10 July 1861. He was educated in the public schools of Xenia, Ill.; was editor of the juvenile department of the New York *Herald*, and since 1899 has been editor of the League department on 'St. Nicholas Magazine.' He has published: 'The Mystery of Eveline Delorme' (1894); 'The Hollow Tree' (1898); 'The Deep Woods' (1899); 'The Great White Way' (1901); 'The Van Dwellers' (1901).

**Paine, Charles Jackson**, American sportsman: b. Boston, Mass. 26 Aug. 1833. He was graduated at Harvard College in 1853 and entered the army as captain of the 22d Massachusetts infantry 8 Oct. 1861. He served with distinction during the Civil War; was appointed brigadier-general of volunteers in 1864; and in 1866 was brevetted major-general. He acquired a large fortune in railway enterprises, and became prominent as a yachtsman. The Puritan, Mayflower, and Volunteer, owned by him, were successful defenders of the America's cup.

**Paine, Halbert Eleazar**, American lawyer and soldier: b. Chardon, Ohio, 4 Feb. 1826; d. 15 April 1905. He was graduated from Western Reserve University, Ohio, in 1845, and practised law in

Cleveland until 1857, when he removed to Milwaukee, Wis. He enlisted in the Union army at the outbreak of the Civil War, and was commissioned colonel, from which rank he rose to be brigadier-general. At Fort Hudson in 1863, where he commanded the third division, he lost a leg, and in 1864 he was discharged with the rank of brevet major-general. He was a member of Congress 1865-71, and in 1888 was appointed commissioner of patents. He published 'Paine on Elections' (1888).

**Paine, John Knowles**, American organist and composer: b. Portland, Maine, 9 Jan. 1839; d. Cambridge, Mass., 25 April 1906. In 1858-61 he studied in Germany, in 1862-73 was instructor in music at Harvard, and in 1875 became professor of music there. He composed the music for the 'Œdipus Tyrannus' of Sophocles, as performed in the original at Cambridge in 1881; the 'Centennial Hymn' to Whittier's words for the Exhibition at Philadelphia in 1876, and the Columbus march and hymn for the World's Columbian Exposition of 1893. Among his further works are: the opera 'Azara'; 'Spring Symphony'; the cantatas, 'The Nativity' and 'The Song of Promise'; choruses to Aristophanes' 'Birds'; symphonic poems; music to the 'Tempest'; and an overture to 'As You Like It.'

**Paine, Levi Leonard**, American theologian: b. Holbrook, Mass., 10 Oct. 1832; d. Bangor, Maine, 10 May 1902. He was graduated from Yale in 1856 and from Yale Divinity School in 1861. He then entered the Congregational ministry and was pastor at Farmington, Maine, 1861-69. In 1870 he became professor of ecclesiastical history in Bangor Theological Seminary and held that post until his death. He was the author of an important work entitled 'A Critical History of the Evolution of Trinitarianism and Its Outcome in the New Christology' (1900).

**Paine, Robert Treat**, signer of the Declaration of Independence: b. Boston 11 March 1731; d. there 11 May 1814. He was graduated at Harvard at 18, studied theology, was chaplain to the New England troops in 1755, and in 1759 was admitted to the bar and began to practise law in Boston. He represented Taunton in 1768 at the convention called to discuss Sir Francis Bernard's dissolution of the general court; conducted the prosecution of Preston and his men for the Boston Massacre 1770, and the impeachment of Peter Oliver for receiving money from the king and not from the colony; served in the general assembly of the State 1773-4, in the Provincial Congress 1774-5, and in the Continental Congress 1774-8, being a signer of the Declaration and a member of various important committees. He was a delegate to the State convention of 1779, which adopted a constitution; was attorney-general of Massachusetts 1780-90; and sat as judge of the supreme court 1790-1804.

**Paine, Robert Treat**, American poet, son of the preceding: b. Taunton 9 Dec. 1773; d. Boston 13 Nov. 1811. His baptismal name, Thomas, was changed in 1801 by act of Legislature, that he might bear his father's name and not that of the famous deist. He was graduated at Harvard in 1792, was then in business for a time, but devoted most of his attention

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to journalism and poetry. His journal, the 'Federal Orrery,' was given up after two years. His marriage with an actress in 1795 shut him out of Boston society and alienated his father. The son practised law with some success and much brilliancy, but he soon fell into wayward courses and died in poverty. His best known poems, which were popular, but practically without value, were: 'The Invention of Letters,' delivered at Cambridge in 1795; 'The Ruling Passion' (1797); the patriotic song, 'Adams and Liberty' (1798); and the bitter political poems, 'The Jacobinad' and 'The Lyars.'

**Paine, Robert Treat**, American philanthropist, great grandson of R. T. Paine (q.v.), signer of the Declaration of Independence: b. Boston 28 Oct. 1835. He was graduated from Harvard in 1858, was admitted to the bar the next year and practised his profession till 1870, when he retired. In 1879 he organized in Boston the Wells Memorial Workingmen's Institute, of which he is president, and he is also president of the Workingmen's Building Association, the Workingmen's Loan Association, and of the Associated Charities of Boston, and in 1890 created and endowed with \$200,000 a charitable trust called 'The Robert Treat Paine Association.' Died Aug. 12, 1910.

**Paine, Thomas**, American political and religious agitator: b. Thetford, Norfolk, England, 29 Jan. 1737; d. New York 8 June 1809. He was a staymaker at Sandwich, Kent, a Methodist preacher in London, a tobacconist at Lewes, Sussex, and an exciseman, before his arrival in America in December 1774. Hostilities having commenced between the mother country and the colonies, he composed his celebrated pamphlet, 'Common Sense' (1776), which was written with great vigor. The object of this tract was to recommend the separation of the colonies from Great Britain. In 1777 he received the office of secretary to the committee of foreign affairs. While in this office he began to publish a series of political appeals called 'The Crisis,' the first number of which contained the words, 'These are the times that try men's souls.' He was obliged to resign his secretaryship in January 1779, being charged with divulging some official secrets in a controversy with Silas Deane, whom he accused of a fraudulent attempt to profit by his agency by conveying the secret supplies of stores from France. But in the following November Pennsylvania testified her approbation of his conduct on this occasion by appointing him clerk to the Assembly. With his salary of £500 as clerk, Paine started the subscription which resulted in the establishment of the Pennsylvania Bank (later the Bank of North America). In 1785 he received \$3,000 from Congress in recognition of his services during the war. He also received 300 acres of land in New Rochelle from the State of New York. In 1787 he embarked for Europe. On the appearance of Burke's 'Reflections on the French Revolution,' he wrote the first part of his 'Rights of Man' (1791) in answer to that celebrated work. The second part was published 1792, and on 21 May in that year a proclamation was issued against wicked and seditious publications, alluding to but not naming the 'Rights of Man.' On the same day the attorney-general commenced a

prosecution against Paine as the author of that work. While the trial was pending he was chosen member of the National Convention for the department of Calais, and, making his escape, went to France. On the trial of Louis XVI. he voted against the sentence of death, proposing his imprisonment during the war and his banishment to the United States afterward. This conduct offended the Jacobins, and toward the close of 1793 he was excluded from the Convention on the ground of his being a foreigner (though he had been naturalized), and immediately after he was arrested and committed to the Luxembourg. Just before his confinement he had finished the first part of his work entitled the 'Age of Reason, being an Investigation of True and Fabulous Theology.' This he confided to the care of his friend, Joel Barlow (q.v.), and it was published in London and Paris in 1794. By this step he forfeited the countenance of the greater part of his American connections. On the fall of Robespierre he was released, and in 1795 published at Paris the second part of his 'Age of Reason.' In May 1796, addressed to the Council of Five Hundred a work entitled 'The Decline and Fall of the System of Finance in England,' and also published his pamphlet, 'Agrarian Justice.' A third part of the 'Age of Reason' was published in 1807. Fearful of being captured by British cruisers, he remained in France till August 1802, when he embarked for America, and reached Baltimore the following October. He was buried on his own farm, but his remains were taken to England by William Cobbett in 1819. The strong part taken by this extraordinary man in religion and politics has produced such extremes of praise and execration that there exist few or no sources of unbiased information either as to his abilities or character except his writings. That he possessed much native vigor of intellect is indisputable, and he was master of a spirited argumentative English style. But much of his work, particularly the 'Age of Reason,' was unscholarly, and his attacks on religious beliefs were ill advised. He was not, however, an atheist, as has been popularly believed. His services to the American cause were lasting and important. The political pamphlets, letters, and addresses of Paine are numerous, and may be found in the collective editions of his works. Conway published an excellent edition of Paine's work in 1893-6. The 'Life of Paine' by the same author, published in 1892, is the standard one. Consult his works edited by M. D. Conway in four volumes (1894-6) and Conway's life of Paine (1892); also Tyler, 'Literary History of the American Revolution' (1896).

**Paine, William H.**, American engineer: b. Chester, N. H., 27 May 1828; d. Cleveland, Ohio, 31 Dec. 1890. He studied civil engineering, engaged in surveying in Wisconsin, and in 1849 surveyed a wagon road over the Rocky Mountains. He was appointed captain of engineers on the staff of Gen. McDowell in 1862, and was later with the Army of the Potomac, where his services were of much value. He assisted in the construction of the Brooklyn Bridge, for a time exercised entire supervision of the work, and from the date of its completion until 1889 was consulting engineer.

## PAINESVILLE — PAINT

**Painesville.** A city 29 miles N. E. of Cleveland, Ohio, the county seat of Lake County, connected by the Lake Shore, the Grand River, the New York, Chicago and St. Louis, the Michigan Southern, and the Pittsburg and Western R. R. It has a population of about 5,000, containing many industrial establishments, a grain elevator, flour mills, iron foundries, machine shops, and brick yards. The municipality owns and operates its own water-works and electric plants for lighting the town. It receives considerable commercial importance from the fact that Fairpoint, making a fine natural harbor on Lake Erie, is but three miles away. The town boasts of a large public library, containing over 5,500 volumes, and a college (Lake Erie College) that dates as far back as 1859. The town itself was founded in 1708, but was not incorporated before 1832, receiving its present charter as late as 1902. The rich agricultural and mining region in which Painesville is situated contributes considerably to its prosperity. Pop. (1910) 5,501.

**Pains and Penalties, Acts of.** An act of legislation passed in England providing for the imposition of punishment without trial upon anyone clearly guilty of treason or similar serious crimes. No capital punishment, however, can be imposed under this statute. In the United States such legislation never has been enacted, nor ever could be, since there is a constitutional clause forbidding all bills of attainder.

**Paint, Luminous,** a phosphorescent substance used as a coating for surfaces. The phenomenon of phosphorescence, which gives to luminous paints its distinctive character, has nothing to do with phosphorus, whose luminosity is due to slow oxidation. The first discovery of a substance emitting light without oxidation belongs to the early part of the seventeenth century, when sulphide of barium (Bologna stone) and chloride of calcium (Homberg's phosphorus) were discovered. Sulphide of calcium dates from 1768; sulphide of strontium is the latest discovery in this kind. Any of these substances, if inclosed in a sealed glass tube and exposed to sunlight, and then carried into a dark room, appears at first brilliantly luminous, and long afterward like a hot body cooling. Practical application has been made of the property in the production of luminous paint, the above compounds being ground and mixed with a vehicle, as in ordinary paint, and laid on the surface that is to be made luminous.

Paint consists of colors or dyes so mixed with oil, glue or water, as to spread easily over a surface, and retain its brilliancy after drying. It is usual to add a dryer, and a solvent or thinner to paints before using them. The vehicles in painting are various, but the principal oil used in oil-painting is that which is obtained from flaxseed. This linseed oil is purified by settling for about four months in tanks with a temperature of 70° F. Dryers are employed to harden the painted surface before it can become dimmed by absorbing the dust with which the atmosphere is charged. To make a successful dryer, lead and manganese compounds are dissolved in oil, which thus becomes oxygenated. They absorb oxygen from the air, and transfer it to the oil, which thus becomes solidified. The opposite agents to these dryers are the solvents, the best of which is

turpentine. The advantage of using turpentine is that, as it is slow to evaporate, it keeps the paint long enough moist to allow of the brush marks sinking and flattening out into a smooth surface. Paints can be rendered to a high degree fire-proof by mixing with them boric acid or a soft and readily fusible glass. The heat melts the boric acid or the glass which forms an air-proof sheath to the wood or other substance so painted, and thus protects them pretty efficiently from the flames. The most permanent of blues is ultramarine, while Prussian blue and indigo are apt to fade. Cobalt, however, is the most lasting of all blues. Among the reds the only really unchanging colors are vermilion and the ochres; madders, carmines, and crimson lakes are likely to fade, the last two very rapidly. Oxide of chromium and terre verte are the only permanent greens; Naples yellow, raw sienna, cadmium, and yellow ochre the only stable yellows. Madder brown and Vandyke brown will fade, but raw and burnt umber and burnt sienna retain their tint forever. All the known blacks and whites are durable excepting when the latter are adulterated with chalk or other impurity. See COAL TAR COLORS; COLORING MATTER; DYES; MINERAL COLORS.

**Paint, Oil, and Varnish Industry.** The art of mixing colors to produce the almost innumerable tints used in painting at the present time has been an evolution of the 19th century, and has developed with the increased demand for the article. In the making of paints there are two essentials, the pigment and the vehicle, the former composing the body or solid substance, ground to a fine powder which is mixed with the latter, or the liquid component, which determines the character of the paint whether oil-paint or water-color. The mixing materials are varied according to the requirements of the work; for water-color drawings and for some kinds of decorative work, gum, glue, size, or other adhesive materials, dissolved in water, are more adaptable; while for oil paintings, the painting of buildings, or for any outside painted work exposed to all kinds of weather, linseed oil, boiled with the sulphate of lead or zinc, or with acetate of lead (sugar of lead), is found to be superior. For indoor work plain linseed oil and oil of turpentine are used; for artists' colors, fine linseed or nut oil is more commonly used, unboiled and in small quantities, and to dilute them, turpentine is generally employed. As before stated the most common vehicle used in oil paints is linseed oil because of its property of oxidizing to a resinous body, which holds the paint in a firm water-proof varnish.

Prior to 1850 all paints were mixed just previous to being used but later a system of mixing paints at a factory was introduced whereby the paints were put up in cans ready for instant use, at the same time the pigment was prevented from settling in the bottom of the can by the mixing in of an emulsion which held it at all times thoroughly mixed with the other ingredients. The first paints ready for use were made in 1852, and were tinted colors in paste form. About 1857 carmine was made from cochineal by D. F. Tiemann & Company, and in 1860 they followed this with a blue which was soluble in water, for use in laundries, and in the same year began the manufacture of quicksilver vermilion.

## PAINTED QUAIL—PAINTING

In the making of water colors gum, glue, or size mixed with water are most generally used. Kalsomine, the most common of the water-colors, is a mixture of prepared chalk with a solution of glue and ultramarine to offset a yellow tint for white. Silicate of sodium (soluble glass) and naphthas and tars, both coal and wood, are used as vehicles for water-color paints.

The paint industry in the United States started in New York City, in 1715, when linseed oil was put on the market as an article of commercial value. This first mill was closely followed in 1718 by one in Connecticut, erected by John Prout, Jr. Later in 1750 the Dunkers, in Lancaster Co., Pa., started the industry and by 1786 had four mills in operation. While paint had been used many years before the linseed-oil industry was started, yet its manufacture added a great stimulus to the use of paints because it aided greatly in the manufacture of paints and varnish and later became a necessary adjunct to the business.

White lead was first successfully made and used commercially in 1804, by Samuel Wetherill, of Philadelphia. This was followed in 1806-7 by the manufacture of different colors, such as rose-pink, Dutch pink, blue, and French green, the inventions of Anthony Tiemann; in 1809 Prussian blue was first put on the market; and later William Guest, of Baltimore, started in to make chrome yellow. Many colors were added to the list in a short time, by 1811 as many as 22 being made in Philadelphia alone, and beside the firms which made these there were also three red-lead factories in Pittsburg, which annually produced goods valued at \$13,000. From that time the growth of the industry was rapid and healthy. Brooklyn and New York each had several large works turning out red and white leads, chrome, and various other colors; the manufacture of Prussian blue was started in Rensselaer Co., N. Y.; and during the next few years factories sprang up in all the large centres of trade, notably Albany, Boston, and Philadelphia.

In 1850 deposits of zinc ore were discovered in New Jersey, and this turned the attention of the manufacturers to an article, which though of an inferior body and opacity to the better qualities of white lead, was recognized as a valuable substitute for white lead as a body for paints. Mineral paints at this time also came into use, the demand for them being great because of their fire-proof and indestructible qualities. As a record of the progress of this industry the following figures are interesting:

	1905	1880
Number of establishments..	449	244
Capital.....	\$55,783,259	\$13,555,292
Salaries, officials, clerks, etc.	3,044	.....
Salaries.....	\$3,654,289	.....
Wage-earners.....	9,781	4,483
Wages.....	\$5,063,177	\$2,132,255
Miscellaneous expenses	\$6,055,367	.....
Cost of material used.....	\$46,306,183	\$17,062,552
Value of product.....	\$67,277,910	\$23,390,767

The manufacture of oil and varnish necessarily developed along with the paint industry. The first factory established in the United States for the manufacture of varnish was founded by

P. B. Smith, in New York City, in 1828. This was followed in 1830 by Tilden & Hurlbert; in 1836 by the firm of Smith & Price of Newark, N. J.; and later by Christian Schrack, of Philadelphia. The quality of the varnish made by the American manufacturers soon became widely known and a large export business was built up, the increase in the manufacture of paint and varnish greatly affecting the oil-mills. Prior to 1836, domestic seed had been entirely used in these mills, but with the increased use of paints and varnish and with the introduction of new and improved machinery, outside markets were invaded by the American traders for the purpose of obtaining raw material for use in the mills of this country, and in 1836 the first cargo of flaxseed was imported from Sicily. Other trading points were rapidly opened up, Odessa, Alexandria, and Calcutta, being the most important. By 1860 there were several factories for the manufacture of varnish in the Eastern States and three had been established west of the Alleghanies and since that time the growth of this industry has been remarkable as shown by the following figures:

	1905	1880
Number of establishments.	190	81
Capital.....	\$19,702,955	\$3,778,100
Salaries, officials, etc.	449	.....
Salaries.....	\$525,568	.....
Wage-earners.....	4,712	573
Wages.....	\$1,200,431	\$366,716
Miscellaneous expenses	\$3,595,970	.....
Cost of materials used.....	\$13,320,491	\$3,699,684
Value of product.....	\$23,561,699	\$5,721,174

In 1910 the exports of paint amounted to over \$4,700,000, having risen from \$20,00 in 1835, and the varnish exported in 1910 amounted to over \$975,000, showing that American colors are found in many foreign markets. See PAINT; VARNISH; LINSEED-OIL INDUSTRY; COTTON-SEED-OIL INDUSTRY; COAL TAR COLORS; COLORING MATTERS; DYES; LUMINOUS PAINT; MINERAL COLORS, ETC.

**Painted Quail.** See QUAIL.

**Painted Terrapin or Tortoise.** See TURTLE.

**Painting**, in the fullest meaning of the word, signifies the application of color to any surface, for the purpose of making it more attractive to the eye, or as a preservative of the substance painted, but in this article the word is restricted to the art of painting, that is, the art of representing objects, real or imaginary, on a flat or nearly flat surface by the use of designs in line and color. The origin of this art, like that of several others known to civilization, is lost in the mists of those prehistoric ages on the banks of the Nile which the researches of modern Egyptologists have pushed back, apparently, to the distance of 80 centuries. Some few traces of it among the unknown autochthonous races who preceded the long lines of the dynasties of Upper and Lower Egypt have been but recently assigned to their proper sources; the art of the dynasties of the Pharaohs and the Ptolemies, notwithstanding their duration by centuries, presents certain striking characteristics which distinguish it from all others. It was strictly a conventional and symbolic art, largely



## PAINTING

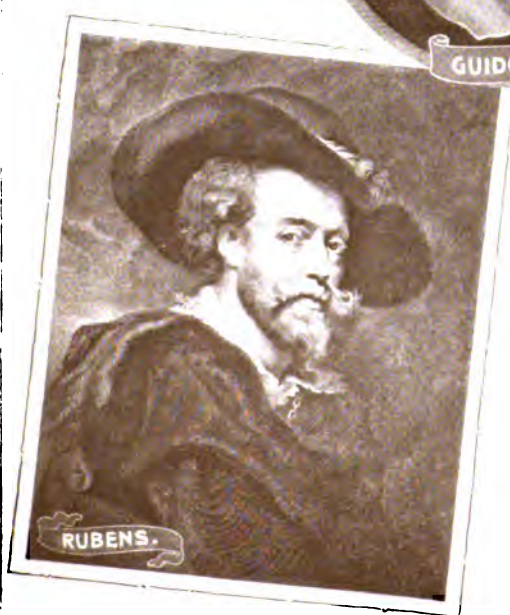
an official art, devoted to the service of the monarch and of religion, and, within these limits, a decorative art. Sculpture was subservient to architecture, and painting—except on the walls of the tombs and in the papyri—to sculpture. Our knowledge of painting is derived from the very numerous examples preserved on the walls of the temples and the tombs, on the mummy cases and the sarcophagi, on the funeral tablets, and the illuminations and vignettes on papyrus and linen. The conventions in which the art remained bound—with but few exceptions—were established in the earliest ages; they embraced all design, religious and secular, requiring that human figures and those of animals should be represented in profile, defined by an outline, and in flat color; for landscape and architecture there was adopted a curious and ingenious combination of drawing, both in ground plan and in elevation, to express the scene in the simplest and clearest manner possible. The background was left blank, or filled with a flat tint; the required lucidity and directness of expression forbade the use of linear or aerial perspective, or any attempt at modeling or variation of the conventional local color. On the inner and outer walls of the temples the outlines were incised, sometimes very deeply,—the figure within these outlines frequently rounded down to the bottom of this incised outline; on the walls of the tombs the painter replaced this outline with one made by his brush. He worked directly on a coat of white stucco, applied over a rough-cast to conceal the joints and the roughness of the masonry wall; of colors—derived mostly from mineral sources—he had, at the most flourishing period of the art, as many as 18 or 20, as we know from wooden palettes of the 18th dynasty, which have been found. These colors were mixed with water and gum tragacanth, possibly with honey; some mummy cases of the later dynasties have been painted in encaustic, and in some cases the eyes and eyebrows of the mummy masks are in enamel. These colors have retained their brilliancy to a remarkable degree through the ages; very few of the paintings are cracked. The artist worked with brushes of reeds or rushes, the ends of which were soaked in water until their fibres separated, and they were adapted to the finest and most delicate work. In the papyri—as in the many hundred copies of the Book of the Dead extant—the illustrations stretch along the top of the page, like head-pieces, or are inserted as vignettes, or initials, or full-page pictures. In many cases they are merely outline sketches in black or red. In general, figures of men are colored a dull red and those of women a light yellow, the gods and the genii of the dead may be of positive greens and blues, and the animals are frequently spotted. The colors are always pleasing and harmonious, and on the largest wall spaces a comprehensive and well sustained color-scheme is frequently found, designed and carried out with true artistic skill. On the outer walls, exposed to full sunlight, and in the deepest recesses of the tombs, the colors are most vivid; in the intermediate chambers of the tombs they are more quiet and discreet, to suit the tempered light. (See *EGYPT*.)

*Greek and Roman Painting.*—In the middle of the 6th century before Christ Greek painting was technically no farther advanced than that

of Egypt or Assyria. Greek writers speak with the same enthusiasm of the works of their great painters as of those of their sculptors, but it is only by these descriptions, and by some supposed copies and adaptations in the work of the craftsmen, mural painters and mosaicists, of the decline of the art under the Roman domination, that we can form some definite conception of these masterpieces. It is noticeable that the rhetoricians are especially impressed by the ability of the painters to represent objects so naturally as to mystify the spectator. The development of the art through its various phases can be fairly well traced in the wall paintings discovered in Etruscan tombs; it practically embraced all subjects, mythology, history, scenes from daily life, landscape, marines, portraits, animals, tragic and satirical representations, still-life, ornament and decoration, and miniatures. Composition, order, linear and aerial perspective, chiaroscuro, a knowledge of the human figure extending to foreshortening, action, expression by gesture and by countenance, all were included. The color work was even extended to the tinting or painting of statues (though there seems to be no proof that the Greeks colored the nude parts of their marble statues) and to the moldings, triglyphs and other ornaments of their architecture. Praxiteles (q.v.) when asked which of his works in marble he valued the most, replied: "Those on which Nikias (the painter) has set his mark."

In Pompeii, the painted portions of the temples are always finished in stucco or plaster. Portrait painting was apparently more in favor among the Romans than among the Greeks. The long series of painted vases—from the earliest examples of the "Pelagic" or pre-Homeric period down to the disappearance of the art about 65 B.C.—was but one of the features of this comprehensive school of painting. The only examples of easel pictures which have been preserved are a few small paintings on marble and slate, found in Herculaneum and in Etruscan tombs.

Apelles introduced the use of a glaze or varnish over the completed tempera painting. In the latter, the colors were tempered with a glue, a gum, honey, white of an egg, juice of the fig, milk, or other glutinous substance, soluble in water, that served to bind them; or with wax or some resin, when these materials had been rendered by any means vehicles that could be worked in water. In tempera painting (see *TEMPERA*), colors were applied to the dry wall; in fresco (see *FRESCO*), to the wall while the plaster was still wet. Both methods are found in Pompeii; the backgrounds always in fresco and, generally, the architectural framing and ornaments; the small figure panels in the centre are generally painted in tempera on the fresco background. In fresco, no colors except earths were used, and these were protected by an encaustic varnish, which also served to give them more brilliancy. Encaustic painting was used only for pictures on tablets or on canvas; in this process naphtha, or spirits of turpentine, or any volatile, ethereal oil that will evaporate, leaving the wax colors firmly fixed, can be used as menstrua to liquify the wax. In the usual method, when the colored sticks of wax and resin have been melted over a fire the colors are applied broadly with a brush and then blended by means of a metallic





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instrument, a spatula or cestrum (generic name *cauterium*), at times used very hot. The same instrument is used to finish the painting by taking, while still hot, cold wax colors and blending and grading them on the first painting. The colored sticks of wax and resin, softened by the addition of an oil, may be applied from a hot palette with a brush and then melted and modeled with the cestrum. The same sticks, softened by the addition of an oil, may be used directly, like crayons of pastel; or, when dissolved in an essential or volatile oil, applied with a brush; but these two methods, not involving the use of heat, are not, strictly speaking, encaustic painting. In all cases, the ancients prepared their walls very carefully before painting, the final surface receiving a firmness and consistency almost equal to that of marble. Their colors were almost exclusively mineral, the only animal substance known being the slimy matter of the purple snail, mixed with chalk,—this purple unknown to the modern palette.

*Byzantine and Early Mediæval.*—The influence of ancient art on that of the early Christians was long in disappearing—notwithstanding the widely divergent tendencies of the new religion. Inheriting the Jewish aversion to idolatry, and to works of material imagery, the Fathers of the Church declaimed against all artists,—Tertullian denounced them as persons of iniquitous occupations. The paintings and decorations in the Roman catacombs—rediscovered at the end of the 16th century,—especially those in the earliest cemeteries, bear a great resemblance to the ancient wall paintings. Orpheus playing on his pipes reappears as the youthful and beardless Christ surrounded by his sheep, and Hermes Kriophoros, carrying a ram on his shoulders, as the Good Shepherd. The bearded type of the Saviour, with which we are familiar, was not generally adopted till later, in the earliest mosaics. As the Church increased in numbers and power the primitive prejudices disappeared, but early Christian painting shared in the general decline of all the contemporary art of the Empire. Occasional efforts were made by the emperors to check this decadence, by Constantine and by Valentinian, Valens and Gratian in the 4th century; and in the 5th, by Theodoric at Ravenna, the capital of the Ostrogothic kingdom in Italy. The first mention of church painting is found in a canon of the council held at Illiberio (Granada), Spain, about 305 A.D.; but the mediæval wall paintings have nearly all disappeared,—very largely by conflagrations. Our insufficient knowledge of the early mediæval painting is principally derived from the mosaics, the most important being at Ravenna and Rome, and from the miniatures and the illuminated manuscripts. In Byzantium, the mosaic wall decorations were not confined to the churches but were also employed to celebrate the deeds and the power of the monarchy, as in the Chalkê, the great state hall of Justinian's palace. With the establishment of the Lombards in Italy, the ideals, the freedom and spirituality of both the Church and its art, fell into even stricter bondage. The subject of the Crucifixion first appears in painting in the latter part of the 6th century, the figure of the Saviour frequently clad in a long purple robe, and sometimes wearing a regal crown. The classical period of early Christian art came to a

close with the outbreak of the Iconoclastic schism, in the beginning of the 8th century.

The mediæval style was formed by the gradual union of these classic traditions with the hereditary art of the Western barbarians conquered by the Empire or who overran it. Each of these races contributed an individual note,—the Irish monks excelled in illuminating manuscripts, their art being continued by the Anglo-Saxons; under Charlemagne mural painting, both sacred and profane, was greatly in favor, though nothing now remains save miniatures; but these primitive impulses did not extend south of the Alps until the Romanesque period, ending in the 13th century. The first indications of Gothic art appear in the miniatures toward the close of this period,—in the angular and broken folds of the draperies, indicating that tendency which was to "govern the human sense of form in all its modes of expression, down to handwriting inclusively."

*Later Mediæval-Gothic.*—It was in France that Gothic architecture took its origin; and there, too, that the other arts took the lead in Europe, in the middle of the 12th century. Painting gradually escaped from the domination of the priestly order; the painters became specialists, working exclusively at mural paintings,—particularly so in the northern countries. Hence, a certain growth of individuality of conception, a tendency toward subtlety and mysticism, an attempt at realism, including study from nature,—the whole, as yet, much hampered by tradition. After the middle of the 14th century there appeared very definite signs of an appreciation of the full capacities of the art of painting and serious attempts to realize them. In this art, including miniature painting in books, France took the lead, as she had done in architecture. The development of Gothic architecture, as it diminished the spaces for wall paintings greatly increased that of the windows, and thus gave a great impetus to the noble art of glass painting (q.v.). In the 14th century, distinct schools of painting begin to appear, as, in Germany, those of Prague, of Cologne, of Westphalia, etc., and even the names of individual artists become known; the panel paintings of the French and the Flemings bear a general resemblance to those of the Lower Rhine; but in Italy the art, both in conceptions and in technical methods, followed distinct national lines,—preparing the way for the Renaissance. Foremost among these precursors were the Tuscans, Niccola Pisano (q.v.), the sculptor, and Giovanni Cimabue (q.v.), the painter. The first great epoch in modern painting is considered to have been that signalized by the mature works of Giotto di Bondone (q.v.) (1276-1336), a pupil of Cimabue, who was acclaimed by his contemporaries as the greatest genius in the arts of Italy. To their astonished eyes, Giotto's power of presenting objects naturally was so great that "the thing itself" was reproduced. With this he combined a great command of the arrangement and execution of monumental mural painting, and a freedom from the traditions both of the Byzantine manner and the Northern Gothic, while reproducing in his works many of the decorative ideas of the ancients. Chief among his followers was Andrea di Cione (q.v.), called L'Arcagnuolo, or, in the contracted form, Orcagna. The painters of the school of Sienna ranked almost in importance

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with those of Florence; and in the Campo Santo of Pisa are still preserved some of the greatest monuments of fresco painting, executed by various artists, of this closing period of the Middle Ages.

*China and Japan.*—The technique of the art of painting in China and Japan is founded primarily on the caligraphic dexterity which was the chief ideal of the older Chinese painters and their Japanese followers, and which is still held in high honor. The ancient art of handwriting was based upon a system of representing or symbolizing the thing indicated, and both it and the art of painting were fettered by traditions that were as binding as those of Egyptian art. Linear design has remained the important element even in painting, the outline being always retained. As an art primarily decorative and suggestive, and not realistic, its fundamental principles differ widely from those of all the European schools. The Japanese themselves compare their art of painting—which they consider the richest and most important, the most intimate expression of the national character—to “sketching.” (*La peinture japonaise a la caractere d'une esquisse*, says the official work published by the Japanese Imperial Commission at the Exposition Universelle of Paris, 1900.) As a *sketch*, or, rather, as a work in which only the essentials are retained—appealing to more artistic and more intelligent taste than the finished realistic picture,—these paintings dispense with careful definition, with chiaroscuro and perspective, qualities neglected by both the Chinese and Japanese masters in their search for idealistic design and decorative feeling. The care bestowed upon the line leads to a very skilful characterization and suggestiveness in design,—marred by the limitations and conventions of both national arts; the generally tempered and restricted color-scheme permits of the most subtle and beautiful tones, and of a very artistic rendering of aerial perspective in the landscapes, especially in the Japanese. The painter does not hesitate to leave his canvas or his paper untouched in spots so as to concentrate on the principal motif; he is in search of an abstract beauty, not of that of the individual—in accord with the Buddhist principle of the social development rather than of that of the individual. This is peculiarly true of the Butsu-yé, or picture of the true Buddhist school, which is distinguished from the works of the secular artists by certain distinctive qualities. In China, notwithstanding the number of epochs which the art of painting has traversed and the varying influences to which it has been subjected, it has retained throughout a general unity of principles. The Japanese claim that in deriving their art from the Koreans, the Chinese and the Hindus, they have bettered their instructions and given their own style to the art,—a greater charm and subtlety of line, a greater delicacy and beauty of tone in the color. Both nations refer the origin of their art to a legendary era, the Japanese claiming 13 centuries of duration, and the Chinese historians ascribing the invention of painting to Che-hoang, minister of the Emperor Hoang-ti, in the 27th century before Christ, contemporary with the introduction of writing by Tsang-hie—these two personages considered by some authorities to have been identical. No satisfactory record of an individual painter, however, appears before

the 3d century A.D., nearly 200 years after the introduction of Buddhist pictures and images from India. According to an ancient Japanese writing, the history of pictorial art began in that country in the reign of the Emperor Yuriaku (457-479 A.D.), introduced by a Chinese painter of royal descent, Nanriu or Shinki. It is probable that Japanese art took its real birth at the period of the introduction of Buddhism in the middle or the 6th century.

*Persia and India.* It was from China that Persia originally derived the arts of architecture, painting and ceramics; for the second of these, the general principles and the technical methods, even to the vellum upon which the paintings were executed, were Chinese. Later, many of the elements of the art were adopted from that of the Arabian Caliphate, an art which had been born in Egypt and developed in Syria. Under the dynasties of the successors of Genghis Khan (1199-1335 A.D.), painting in Persia assumed definite forms and characteristics; indeed, it is asserted to have been borrowed from Turanian, Dravidian, Greek, Sassanian, Mongol, and European sources. During the Mahommedan domination its influence was extended to India, where it succeeded the native traditions. The art of the two countries under the Mongol emperors was practically the same; in both, the ancient mural paintings having almost completely disappeared, it is preserved only in the miniatures. Modern Hindu painting and sculpture are both in lamentable decadence; the former, never having even undertaken to represent nature, is content with traditional and decorative formulas.

For painting of Europe after the close of the Mediæval epoch, see RENAISSANCE PAINTING; POST-RENAISSANCE PAINTING.

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## PAINTING, EDUCATION IN

**Painting, Education in.** The education of the painter is to-day altogether different from what it was in the Middle Ages and the Renaissance, and this difference is largely dependent upon a different conception of the social status of the artist. In the mediæval world the painter was a craftsman, like the carpenter or the smith. The individual artist might rise to some eminence and consideration, but as an artist he was a member of a mechanical trade which no one would have thought of putting on a level with the learned professions. To-day the painter, the sculptor, the architect, is a professional man, like the lawyer or the doctor, and his education is planned, as nearly as possible, on the lines of theirs. As long as the artist was considered a tradesman he was educated like a tradesman, that is, by apprenticeship to a master of the craft. In a modified form this apprenticeship system was in force as late as the 18th century, but its character can best be understood by considering it as it was practised in the 15th.

In the 15th century, then, the master painter kept a shop, a bottega, which differed in no essential particular from the shop of any other tradesman, and his business was to supply anything that was wanted in the way of painting, from the ornamentation of a chest or the painting of a sign to the production of an altar-piece or the frescoing of a palace wall. He maintained a force of journeymen and apprentices, and it was no more expected that he should produce with his own hands everything which left his shop than it was expected that the master joiner should saw every beam or the master mason lay every stone. To such a master a boy who showed any disposition toward art was bound out, at the age of 12 or 13, for a term of years. He was to give his services in any capacity in which they were available and a sum of money was paid the master, who, in return for this premium and service, engaged himself to teach the boy his trade. The apprentices swept out the shop, ran errands, waited on customers, ground colors, prepared canvases and panels, pricked cartoons and pounced them upon the wall, set the palette and cleaned the brushes of the master. At odd times they copied the master's studies, and always they watched his methods and learned how he did things and by what succession of processes a picture was produced. At the end of his term of apprenticeship the boy had learned enough to be useful and was worth a wage. He became a journeyman, and was free to stay with his master or to engage himself to another. At this stage of his evolution he was intrusted with more important work, painted backgrounds or draperies from the master's studies, made studies himself for the less important parts of pictures, finally painted entire pictures himself under the master's supervision and on the master's account—pictures which were almost indistinguishable from the master's own and were frequently signed by him before delivery to the customer who had ordered them.

If the young painter were unambitious he might remain at this stage all his life. If he were determined to be a master in his turn he probably traveled a little and engaged himself to this or that more celebrated master that he might study other methods than those he had

learned, pick up other traditions, and familiarize himself with the best work that was being done in his art. When he could do what his masters did as well as they did it, and hardly until then, he was ready to observe nature for himself, to allow his own temperament to influence his work, to become, perhaps, a creator and an innovator, and to teach others all that he had been taught and all that he had learned for himself, so that they might begin, as nearly as possible, where he left off.

The typical education of a modern painter is as different from this as possible. He begins his special education later than did the mediæval painter, having spent some years in ordinary schooling, perhaps, even, in securing a college training. He may have done a little desultory drawing during this time, but, about the age of 20 or later, he decides to become a painter and begins his serious education in art. He begins it not as an apprentice, but as a student; not in a shop, but in a school. If the school is a great state institution or one connected with a university it will afford lectures on the theory and history of art, to which, likely enough, he will pay little attention. It will be in a great city where he will be able to visit museums which have gathered together the art of many ages and many countries and to see exhibitions where almost as many methods of work are exemplified as there are individual exhibitors. Even in default of museums and exhibitions he will infallibly have access to many cheap publications which, by some of the applications of photography, will give him a fair idea of the results attained by the art of the past and the present; of its methods he will know nothing. Meanwhile, he will be set down before a plaster cast or a living model and bidden to draw. He will be more or less thoroughly grounded in anatomy and perspective and other sciences, above all in the science of aspects, but he will have practically no instruction whatever in his craft. His canvases and colors, like his brushes, he will buy ready made. His master he will see twice a week, for a few minutes, and that master's criticisms will be directed exclusively to the justness of his observation and the truth of his rendering of nature. The master's own work will be carried on in another place, in quiet and in solitude, and the student will know nothing of it except, now and then, to see the completed picture. The more intelligent and conscientious the master the less likely he will be to attempt real technical instruction, for he will feel that his own methods are tentative, suited to himself alone, and of doubtful validity or permanence, while he will be hampered by our modern respect for individuality and the fear of destroying something more precious than anything he can supply.

After three to five years work on this system our student will be able to draw with fair accuracy anything set before him, to distinguish its values, even to copy its color with some approximation to success. On the other hand he will have exercised little either his invention or his memory, will be entirely in the dark as to what he wishes to do with his acquired science, and will have practically no knowledge of the thousand and one processes that go to the production of a picture. Likely enough he will never have made a tracing or squared up



## PAIRING—PAISLEY

a sketch; almost certainly he will never have arranged a drapery; quite certainly he will, no more than his master, know anything of the proper management of oil colors, of the use of vehicles, or of the composition and permanence of pigments. For a time he will try to do outside the school what he has always done in it, and will be surprised that no one cares for the result. Then it will perhaps dawn upon him that he has learned a science, but not an art, he will flounder and experiment, and, if he is a man of force and originality, he will invent an art of his own and methods that will somehow serve his needs. If he is of a cool and logical mind he will recognize that his training was vastly better than none and will, in default of a better, recommend it to others or help to give it to them. If he is of a warm and emotional temper he will condemn it as useless or worse and tell those who consult him to get along without it.

It is obvious that the results of these two educations must differ as greatly as the conditions which produced them. The modern painter may readily be a man of broader culture and wider outlook than the painter of the Renaissance; with anything like the same original force he will probably be a more personal and individual artist; he will certainly know a great deal about the aspects of nature that the Renaissance painter never dreamed of. Just as surely he will be the inferior of the Renaissance painter as an efficient workman, will rarely attain complete mastery of his tools, and will try to substitute the charm of his personal sentiment and his individual view of nature for that assured rightness which comes of an accepted body of traditions and the possession of tried methods. What modern art has gained in variety and in the perception of new truths it has lost in weight and coherence. Each artist works in his own way for the attainment of self-expression and does little toward the building up of a great school.

It is easier to see the weakness of modern education in painting than to devise a remedy, and those who are most opposed to the modern academic system seldom suggest anything to take its place. There are many reasons why the old apprenticeship system could hardly be revived. There are such multitudes of students to-day that it would be impossible to find masters for them, and our masters have, in general, nothing for apprentices to do. They are no longer at the head of great workshops, turning out a multiplicity of diverse products. Each is engaged in a more or less narrow specialty, producing work which is valuable only as it possesses his personal quality and exhibits his personal touch, and his patrons would resent the intrusion of any hand but his own as little less than commercial dishonesty. The modern student, also, knows too much of the art of all times and countries to choose a single master and docilely follow his teaching. It is doubtful if modern conditions have not rendered forever impossible anything like a local school of painting.

The conditions of mural painting do, indeed, entail something like the old apprenticeship system, and in the growing demand for the decoration of public and private buildings there is a hope for the revival of older methods of education. It is recognized that a decorative

painter may properly have a corps of assistants, and while these assistants are not likely to be mere beginners, but will already have had an academic training, they are enabled to supplement it with the practical instruction of a master in the methods of creating a work of art. How far a similar instruction can be grafted on our academic system is the problem that should most seriously occupy the directors of our schools of art. The rigid discipline in drawing and painting from nature need not be relaxed—in its way it is admirable and should be strengthened rather than weakened—but it should be pointed out that the ability to imitate form and color is a tool, not an end, and that the creation of a work of art is something different from the production of a life-study. The student should be encouraged to train his imagination and his memory as well as his eye, and it would be well if some knowledge of technical processes could be conveyed and the pupil encouraged, as soon as he is at all fit, to attempt the actual creation of a work of art, under the guidance of the master. Meanwhile it should be insisted upon that the education of eye and hand can hardly begin too early, if technical mastery is to be attained, and that we must be willing to sacrifice something of the education of a gentleman to the education of a painter. See, also, ARCHITECTURE, EDUCATION IN; SCULPTURE, EDUCATION IN.

KENYON COX.

**Pairing**, in legislative and other assemblies, a practice by which two members belonging to opposite parties or factions agree that both shall be absent for a specified time, or that both shall abstain from voting on a particular question. Thus a vote is nullified on each side. The terms pairs and pairing-off are also frequently used.

**Paisiello**, or **Paisiello, Giovanni**, Italian composer: b. Taranto 9 May 1741; d. Naples 5 June 1816. After having received his musical education in the conservatory of Saint Onofrio at Naples in 1776 he went to Saint Petersburg, where he produced the opera 'Il Barbiere di Siviglia.' After remaining at Saint Petersburg for eight years he returned to Naples by way of Vienna, where he composed 12 symphonies for large orchestra, and wrote the opera 'Il Re Teodoro.' In Naples he remained for 13 or 14 years, from 1785 to 1799, and during this time he composed some of the operas which were produced at the Neapolitan Theatre, and he was also made chapel master to Ferdinand IV. In 1802 he went to Paris to organize the music of the chapel of Napoleon, and while there excited much jealousy, but it was not until 1804, when his opera 'Proserpine' had been produced and proven a failure that he returned to Naples. Paisiello produced between 95 and 100 operas, besides 100 masses, requiems, etc. Among the most prominent of his operas may be mentioned: 'Dal finto al vero,' composed in 1777; 'Il Marchese di Tulipano'; 'Nina, o la Pazza d'Amore'; 'La Molinara.'

**Paisley**, pāz'li, Scotland, a manufacturing town of Renfrewshire, on the White Cart, about three miles above its confluence with the Clyde, and seven miles west-southwest of Glasgow. It consists of an old town on the west or left, and a new town on the east or right bank of

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the river, communicating by three handsome bridges. The most noteworthy building is the restored Abbey Church of a monastery founded in 1163 by Walter, son of Alan, the first of the house of the Stewarts. Other noteworthy edifices are the new county buildings, the old county buildings and prison, a quadrangular pile in the castellated style; the town-hall, an imposing building in the classical style; the Neilson educational institution; the buildings containing the free library and museum; the Coats Observatory, and the Coats Memorial Church (Baptist). Paisley has been long noted for its manufactures, especially of textile goods. The shawl manufacture, introduced about the beginning of the present century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, though the chief industry is that of sewing cotton, for which Paisley is celebrated all over the world. Wilson the ornithologist, the poet Tannahill, and Prof. Wilson (Christopher North) were natives of Paisley, which possesses a bronze statue of the ornithologist and of the poet. Paisley, the mediæval *Passeleth*, is a town of ancient origin, having been at one time a Roman station under the name of *Vandura*.

**Paixhans, Henri Joseph**, ôñ-rê zhō-zêf pāk-sāns, or pāk'anz, French general: b. Metz 22 Jan. 1783; d. Jouy-aux-Arches 19 Aug. 1854. He entered the artillery after being graduated at the Ecole Polytechnique, fought under the Empire with great bravery, especially at the siege of Paris in 1814, and in 1848 became division commander. From 1830 to 1848 he was a member of the House of Deputies. Paixhans invented a howitzer called by his name, which carried hollow shot and cylindrical, conically pointed shells, also of his invention. His later years were particularly devoted to the improvement of floating batteries. He wrote several valuable studies of army and navy ordnance.

**Paixhans Gun.** See **ORDNANCE**.

**Pajou, Augustin**, French sculptor: b. Paris 19 Sept. 1730; d. there 8 May 1809. He became a pupil of Lemoine and won the Prix de Rome in 1748, after which he studied for 12 years at Rome. Upon his return he was elected to the academy and was employed by Louis XVI. to make statues of Buffon, Descartes, Pascal, Bossuet, and Turenne. In the Louvre may be seen 'Pluto Holding Cerebus in Chains,' 'Psyche,' and a bust of Madame de Pompadour, together with other works executed by him. The sculptures of the Salle de l'Opéra at Versailles and the ornaments of the Cathedral of Orleans and of the Palais Bourbon are typical samples of his work.

**Pakawa, pā-kā-wā'.** See **PINTO**.

**Pakenham, pāk'en-am**, Sir Edward Michael, British soldier: b. County Westmeath, Ireland, 19 March 1778; d. near New Orleans, La., 8 Jan. 1815. He was a lieutenant in the British army in 1794 and served with distinction under his brother-in-law, the Duke of Wellington, in the Peninsular and French campaigns. In 1814, after the death of Gen. Ross at Baltimore, he was appointed to the command of the British forces there. He led the expedition against New Orleans, where his forces were defeated by Gen. Jackson, and was killed in battle 8 Jan. 1815. See **NEW ORLEANS, BATTLE OF**.

**Palæobotany, or Fossil Botany**, the branch of palæontology which treats of fossil plants. Under this term is included the study of all dead vegetable matter which has become fossilized or has left its traces in any part of the earth's crust or in its superficial deposits.

**History.**—Fossil remains of vegetation, in the form of petrified wood, were described centuries ago by writers on natural history, and leaf impressions were described and figured by Johann Daniel Major, in his 'Lithologia curiosa, sive de animalibus et plantis in lapides versis,' published at Jena in 1664, and by Eduard Lhwyd, in his 'Lithophylacii Britannici Ichnographia,' published at London in 1699, but it was not until the early part of the 19th century, when Baron von Schlotheim issued his 'Abhandlung über die Kräuter-Abdrücke im Schieferthon und Sandstein der Steinkohlen-Formation,' and his 'Beschreibung merkwürdiger Kräuter-Abdrücke und Pflanzen-Versteinerungen, ein Beitrag zur Flora der Vorwelt,' at Leipsic in 1801 and Gotha in 1804 respectively, that the study of fossil plants was placed upon a scientific basis. Since then the subject has received constantly increasing attention, and it is now recognized as co-ordinate in importance with palæozoology, in interpreting the age or the succession of geologic formations, or in discussing the evolution of allied living organisms.

**Principles.**—The study of the extinct flora of the earth has shown that our living flora has been

Geologic Time Divisions	Geologic Periods	Plant Ages	
Neozoic	Modern Quaternary Tertiary	Age of Spermatophytes	Age of Angiosperms
Mesozoic	Cretaceous Jurassic Triassic	Age of Gymnosperms	Age of Gymnosperms
Palæozoic	Carboniferous Devonian U. Silurian, L. Silurian, Ordovician, Cambrian	Age of Cryptophytes	Age of Peridophytes
Eozoic	Huronian Laurentian	Age of Thallophytes	

evolved from simple forms, low in the scale of life, through forms successively higher and more complex. Some reached a maximum of development far back in geological time and then retrograded or became extinct, while others have continued their upward development to the present day. The period of maximum development of any type is known as the 'age' of that type, and thus it is possible to divide geologic time as a whole into a succession or series of plant ages and to designate each age by the name of the particular type of vegetation which was predominant at that time. Such a series, based upon the known facts of palæobotany, would be indicated in the preceding table.

In a similar manner other subdivisions of the vegetable kingdom could have their respective 'ages' indicated and the table could be

made to show when each family, order or class of plants was in the ascendant.

The general character or *facies* of any fossil flora will always determine the time division to which it belongs; the identification of a few of its component genera is sufficient to determine the period, and the identification of certain typical genera or species will determine the exact, or approximate stratigraphic position of the particular formation or strata of the period in which they occur. It is the recognition of these facts which has led to the acceptance of the broad principle that "great types of vegetation are characteristic of great epochs in geology, and it is impossible for the types of one epoch to occur in another."

The above principle, however, requires a modified application when floras of widely separated localities are under consideration, for the reason that evolution has not always maintained a uniform rate of progress in all parts of the world. In some localities it has been more rapid than in others, hence the same types may occur in different parts of the world in strata that are not quite contemporaneous; but the order of sequence of types, in all localities, has always been found to be the same.

**Botanical Development.**—On theoretical grounds plant life is assumed to have preceded animal life, not only for the reason that the latter is dependent upon the former for its existence and sustenance, but also because plants are lower in the scale of life than animals and are capable of existing under conditions that would be fatal to the latter. If the "nebular hypothesis" is accepted for the origin of our earth, there must have been a long period of time when its land and its waters were at a temperature too high to admit of the existence of any kind of life; but we know that some of the lowest forms of vegetation, represented by the lower thallophytes, can and do live in water at a temperature which is fatal to all other forms of life, hence it is assumed that these were the first to appear. This assumption is also strongly emphasized by the fact that the earliest recognizable fossil forms are thallophytes. Exactly what the primitive vegetation of the earth was like can not be determined, for the reason that its remains were either entirely obliterated, or so altered, by the metamorphism to which all the older rocks were subjected, that its original characters are lost. Its former existence, however, is indicated by the presence of carbon, in the form of graphite, in these rocks, and graphite is known in numerous instances to have resulted from the metamorphism of coal derived from vegetation.

**Thallophytes.**—The microscopic size of the lower thallophytes and the cellular structure of the others are factors which would make them poor subjects for preservation, and their comparative rarity as fossils is therefore to be expected. The schizophytes, representing the agencies of disintegration and decay, must have been present at the very beginning, but their assumed existence is purely theoretical. Fungi also play a very unimportant part in fossil botany. A few of the woody forms have been recognized and they are also represented by thallus and mycelium fragments, and presumably by certain indications of disintegration, in the tissues of higher plants, notably in those of the Carboniferous Period, and by spots or other

markings on leaves, bark, or wood, from more recent formations. About 400 species, included in about 70 genera, have been described. The lichens are also but little known as fossils, and such as have been discovered are fragmentary and unsatisfactory. They consist mostly of flakes, attached to pieces of fossil wood, or enclosed in amber, and have not been recognized in strata older than those belonging to the Tertiary Period. Seaweeds and fresh-water algae are abundantly represented by casts, tracings, and markings of various forms, and occasionally by the remains of the stems, when they were of sufficient consistency for preservation. Many of these forms, originally described as algae, are exceedingly problematic, and others have been subsequently shown to be mere inorganic markings or to be due to the tracks, trails or burrows of animals. Even if all the doubtful forms are eliminated, however, a sufficient number remain to demonstrate their existence as far back as the Cambrian Period, and they are represented in the rocks of every succeeding period. The diatoms are most abundantly represented, and they are also the most perfectly preserved of all the thallophytes, by reason of their silicious tests. They occur from the Cretaceous Period upward, forming beds of "tripoli," in various parts of the world, notably at Bilin, in Bohemia, and Richmond, Va. The genera and species are largely the same as those now living. The Characeæ have been identified, by means of their fruit cases, in rocks of Devonian age in North America, and also by stem fragments in those of the Jurassic and later periods.

**Bryophytes.**—Mosses and liverworts are but sparingly represented as fossils, and are practically unknown except in Tertiary and more recent deposits. All that have been identified are either the same as or very closely related to living species. Peat is largely composed of the remains of mosses, mostly belonging to the genus *Sphagnum*.

**Pteridophytes.**—The ferns, and their allies, lycopods and equisetums, compose the most interesting of any group of fossil plants. They had their origin far back in geologic time, probably in the Lower Silurian (Ordovician) Period. In the Devonian they had become well established and their maximum of development was reached in the Carboniferous, at which time they probably formed at least 75 per cent of the entire flora. After that they steadily declined, not only in numbers but also biologically, and their present living representatives are mere degenerate descendants of the gigantic forms which preceded them. The ferns certainly began as far back as the Devonian Period, and probably earlier. They are the best known of all fossil plants, and were the first to receive serious attention and study from palæobotanists. This was largely due to their extensive representation in connection with the coal of the Carboniferous Period and their discovery as an incident of mining operations, through which they were being constantly brought to light. They probably contributed 50 per cent to the entire flora of that period, but this proportion declined to about 30 per cent in Mesozoic time and in Neozoic to about 5 per cent. In general appearance the Palæozoic forms differed but little, except in size, from those of today, and many of the Mesozoic forms were apparently identical with living genera, while

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some Tertiary species are hardly to be separated from living ones. Equisetums, or plants very closely related to them, are definitely recognized in rocks of Devonian age, and, like the ferns, they rapidly developed in the Carboniferous Period. These Palæozoic forms are represented by the extinct genera *Calamites*, *Calamodendron*, etc., the genus *Equisetum* not appearing until later on, in Mesozoic time. The lycopods probably had their beginning as far back as the lower part of the Upper Silurian Period, and reached their maximum of development in the Carboniferous, at which time they were, next to the ferns, the most important element in the flora. Their gigantic trunks and limbs are known under the generic names, *Lepidodendron*, *Lepidophloios*, etc. These genera became extinct at the close of Palæozoic time and were succeeded by others closely related to or identical with the living *Lycopodium* and *Selaginella*. Other types of doubtful botanical relationship, but apparently closely related to one or another of the above groups, were the genera *Sphenophyllum* and *Sigillaria*. The rhizocarps are known, to a limited extent, as fossils; but like their living representatives are small and inconspicuous. Well preserved species of *Salvinia* have been found in rocks of Cretaceous and Tertiary age and remains of questionable relationship in rocks considerably older.

*Spermatophytes*.—The time of origin of this sub-kingdom of plants is more or less obscure, but it probably dates as far back as the Upper Silurian Period, and they are definitely known to have been in existence in the Devonian. Their development was slow and they did not assume any degree of prominence until Mesozoic time, when they became the dominant type of vegetation and have continued as such up to the present time.

The gymnosperms, of which our coniferous trees and cycads are the best known representatives, are the oldest type. The extinct genus *Cordaites* is known in the Devonian Period, but as a class they were of little numerical importance until Mesozoic time, when, in the Triassic and Jurassic Periods they reached their maximum of development and became the dominant type of vegetation, forming perhaps 60 per cent of the flora. Since then the cycads have almost disappeared, except in the warm parts of the world, but the coniferous trees, although in diminished numbers, are yet an important element in the living flora of all sections. Several ancient genera, such as *Sequoia*, to which the giant trees of California belong, and *Ginkgo*, represented only in our living flora by the maidenhair tree of Japan, were formerly of world-wide range, but are now restricted to limited localities and unless protected are liable to become extinct in the near future.

The angiosperms may have had their origin in late Palæozoic time, but the earliest remains which have been satisfactorily identified are not older than Mesozoic. Toward the close of the Jurassic Period they appeared in considerable numbers and subsequently developed so rapidly that in the Cretaceous Period they had become the dominant type and they have maintained this position ever since. The Monocotyledones are relatively not well represented as fossils and their origin is obscure. On theoretical grounds they probably antedated the more highly devel-

oped Dicotyledones, but satisfactory evidence on this point is lacking. Fan palms are known from the upper Cretaceous and these were probably preceded by grasses or sedges, but their remains are mostly found in deposits of Tertiary age. The Dicotyledones are first recognizable in certain archaic forms, from the Jurassic or lower Cretaceous horizons of North America and Europe, to which Saporta gave the name "proangiosperms." In some of these the dicotyledon type, as we know it in our living flora, is merely indicated rather than expressed, and it is almost impossible to classify them satisfactorily with any living allies. From these, however, the modern generic types of the dicotyledones developed so rapidly that it was essentially a modern flora, in all except its species, by the middle of the Cretaceous Period, and what are apparently living species began to appear in the early Tertiary. At the close of the Tertiary Period it is probable that nearly all the species were identical with living ones, as all the remains which have been found in Quaternary deposits are identifiable or referable to species now in existence.

*Relation to Botany*.—If the general development of the vegetable kingdom in the past is broadly viewed it becomes at once apparent that this development or phylogeny follows very closely the modern conceptions of the interrelations, or taxonomy, of plant-life as it now exists, and it is significant that all the changes which have been made from time to time in taxonomic arrangement have constantly brought it closer and closer into harmony with the known facts of phylogeny, until, at the present time, all scientific systems of classification are based upon the principle of development from lower to higher forms, and nearly all catalogues or lists of plants and manuals or text-books of botany are arranged in accordance with this principle. Palæobotany has thus been of great assistance to botany in placing it upon a sound and philosophic basis.

The demonstration of the fact that the vegetation now in existence is merely the remnants of that which formerly existed, has resulted in solving, or at least in throwing a flood of light upon, many of the problems that puzzled the early botanists. Wide gaps between living genera were bridged by the discovery of extinct forms, and isolated or monotypic genera, such as *Liriodendron*, of which our tulip tree is the sole living representative, *Sassafras*, which also contains but the one species, etc., were shown to have been composed, in the past, of a large number of species, and that the present generic isolation is due to the extinction of all but one of their former component species. Many of the apparent anomalies in connection with the geographical distribution of certain living plants have also been cleared away by the discoveries of palæobotany. A number of genera, for example, are known to be restricted to the two widely separated regions of Eastern Asia and Eastern North America and impossible theories of migration were proposed in order to account for such phenomena, until the fossil representatives of the genera were found, and the fact was demonstrated that they were once of world-wide distribution but have become extinct in the intermediate regions. The presence of abnormal or apparently useless organs in living plants has also been explained on the theory of atavism or

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reversion to former ancestral characteristics and the changes in form through which all plants pass, from youth to maturity, have frequently been shown to be identical with, or closely similar to, ancestral changes in the development or evolution of the types to which they belong. These and numerous other phenomena would have been impossible of rational explanation without the aid of the facts made known by palæobotany.

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**Palæography** (Gr. *παλαιος*, old; *γράφειν*, to write), the science of ancient handwriting. It is occupied with the materials, the characters and use of written documents with a view to determine their date, authenticity and place of production. As a general term palæography proper includes neither epigraphy nor diplomatics. Epigraphy is the science of inscriptions found on stone, metal or pottery. Diplomats is concerned only with legal documents, and although it perhaps gave the first impulse to the study of palæography it lost its main importance after the French Revolution, and the science of handwriting is now chiefly occupied with manuscripts of literary or historic interest.

**Materials.**—In the most rudimentary stage of civilization leaves, bark, or woven cloth were employed for the pages of books or material on which to write matter of any kind. Wax tablets on which letters could be stamped or cut with a stylus, or needle of metal or bone, were used in ancient Italy and through the Middle Ages in France. The black wax was poured on to a rimmed quadrangular piece of wood, or tablet, and many such pages were often bound together so as to form a codex or volume. Codices of this sort have been discovered among the ruins of Pompeii and elsewhere. A species of paper called papyrus was also employed; it was made of the pith of an Egyptian sedge. This pith was cut into strips which were laid side by side on a flat surface, and a second layer of strips superimposed at right angles. This was then subjected to heavy pressure and the natural gluten of the substance caused the two layers to adhere and form a smooth sheet which, when dried, was ready for use. Many rolls of this paper have come to light in old Italian towns, notably at Herculaneum and Ravenna, but papyrus was extensively used in Egypt and Greece as well as in the Asiatic cities on the coast of the Ægean. It was also employed during the Middle Ages, and the popes regularly wrote on papyrus until the end of the 11th century. Parchment took the place of papyrus about the 1st century A.D., taking its name from Pergamos—*papyrus Pergamenus*, or paper of Pergamos—where it was first made in perfection; although skins of animals were used for writing upon as early as

least as 500 B.C. Parchment manuscripts are found in square pages, and take the form of the modern book; they are not rolled so as to make what the Romans called *volumen*, a scroll or volume, but bound together in consecutive pages like wax tablets in the codex. It is of course from Egypt that the earliest papyri come. The 'Papyrus Prisse' was found in a tomb of the 11th Dynasty and antedates Exodus by several centuries.

**Characters.**—It is impossible within the limits of the present paper to discuss Egyptian palæography (see *HIEROGLYPHICS*) and the hieratic or demotic papyri, much less the Chinese, Pali, Indian, Syriac, Hebrew, Persian or Arabic handwritings and manuscripts. The principles of palæography may be seen in their simplest form from an examination of Greek and Latin alphabets, and a consideration of some of the most interesting palæographical remains written in those letters. The first obvious variety which we meet with in both Greek and Latin manuscripts of the same period, is what we may call the book hand, and the cursive hand, which correspond roughly with our modern printed and written lettering. The book hand is that of the professional scribe or amanuensis and is stiff and regular but thoroughly legible. The cursive hand is irregular and careless, as if rapidly produced. The one is employed by those who write out what is to be permanent and readable by anyone; the other is for private memoranda, letters, and accounts. For convenience, the letters in a book hand may be divided into two classes, majuscule and minuscule. The majuscule comprise capital and uncial letters. The letters employed in epigraphy or inscription writing furnish the pattern for these capitals, which are square and stiff. The word uncial means inch-high, and is a term of exaggeration used by Saint Jerome in the sense of tall or handsome. The uncial letter is of the same proportions as the capital but is boldly curved, and is clear to the eye as well as often extremely elegant in appearance. The other book hand, the minuscule, was a combination in its principles of the cursive and uncial; it derived its name from the fact that it was never as large as either type of the majuscule. The Latin and Greek uncials very much resemble each other, but in the cursive hand the distinctions are very noticeable.

**Greek Palæography.**—Greek papyri may be divided into three classes according to their period. The Ptolemaic manuscripts were produced 323–30 B.C.; the lettering is bold and flowing. The Roman papyri were written in the period between Augustus and Diocletian (31 B.C. to 284 A.D.) and their lettering was fluent and finely rounded. Equally recognizable by the expert is the large and showy style of the Byzantine manuscript, which belongs to the period between 360 and 640 A.D. The early uncials of the Ptolemaic period are the oldest Greek manuscripts which are extant and have been found in tombs where the papyri have been buried. Perhaps the earliest was produced in the first half of the 2d century B.C. Greek papyri earlier than the Christian era are not uncommon. Among them are fragments of Homer and Hyperides, the Athenian orator. The earliest Greek cursive manuscript which is

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extant consists of letters and memoranda made by Ptolemy, son of Glaucias, who lived as a recluse in the Serapeum or precinct of Serapis 170 B.C. There are extant about 300 vellum codices, the oldest of which may be set at 506 A.D. The three great Biblical codices are considered the production of the 4th century, the Codex Alexandrinus of the 5th. The earliest minuscule script yet discovered is found on the private papers and business memoranda of Aurelius Pachymius, a purple dye merchant 592-616 A.D. Ligatures began to invade cursive calligraphy at the beginning of the 13th century, and were imitated in the earliest printed books.

**Latin Palæography.**—In Latin manuscripts there were four scripts employed in books, these being, capitals, uncials, semi-uncials and minuscules. Capitals are either Square, having their lines at right angles, or Rustic, in which the ends are twisted and the cross bars oblique and curved. Of the Square capitals the Saint Gall Virgil of the 4th century affords the best example. The character of the Rustic is well exhibited in the four great manuscripts of Virgil, the Codex Vaticanus (4th century), Codex Palatinus (5th century); Codex Romanus (6th century) and the Medicæan Virgil (5th century). The Uncial Latin character was a modification of the angular and rigid epigraphic lettering on tombs and monuments. This is especially apparent in E, M, V, H. The tails of P, F, Q, and R hang below the line, while the upright of h rises above it. Good examples of Latin uncials of the earliest type are the Vescelli Gospels, as early as the time of Eusebius the historian; the Codex Bezae (6th century) at Cambridge, England, and the palimpsest Cicero in the Vatican, also the Vatican Cicero (4th century) over which is written in smaller uncials (7th century) Saint Augustine *In Psalmos*. The large, regular uncial is supplanted in Latin manuscripts of the 8th century by semi-uncials, sometimes larger in size than uncials, but modified in form by the influence of the old Roman cursive. The Hilary (6th century) of Chapter library of Saint Peter's, Rome, is a good example of this script.

The Latin cursive was unknown to palæographers, though they had long suspected its existence, before 1875, when specimens were found in the shape of wax-tablets (55 A.D.). This script is hard to decipher, and exhibits forms out of which arose modern lower-case G, B, F, M, N, D, R, H. It was employed in a modified shape as well for civil as public uses during the Middle Ages, and many of its forms survive to-day in German script. The official Roman handwriting arose in the 16th century and the last degeneration of the old cursive is seen in the crabbed and illegible lettering of what was styled *litteræ Sancti Petri*, the official script of the popes.

The national alphabets of Europe were modifications of the Roman cursive and uncial. The Irish semi-uncial is the basis of the modern "Roman." Good examples of the Irish alphabet are St. Chad's Gospel at Lindisfarne, and Saint Cuthbert's Gospels; it passed from Ireland to Northumbria where Alcuin of York, tutor of Charlemagne, introduced it into the famous calligraphic school in St. Martin's monastery at Tours, whence it was rapidly diffused over all

Europe. In the 13th century it was twisted and deformed into the Black Letter or Gothic, still seen in Germany, but after the Renaissance and the invention of printing a return was made to the beautiful minuscule of Charlemagne, improved in the middle of the 16th century by the refining influence of Italian calligraphy.

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**Palæontology**, the science of the ancient life that inhabited the earth during the vast periods of time which have antedated the age of man. This science dates back only to the beginning of the 19th century, when William Smith, Cuvier, Brongniart, Lamarck, Blumenbach and Schlotheim initiated the study of fossil life as a distinct branch of scientific research. It was christened "palæontology" by de Blainville and Fischer von Waldheim in 1834. Erroneous and fantastic ideas regarding the nature and origin of organic fossils had prevailed till the last decade of the 18th century, interesting accounts of which, as well as of the later history of the science, may be read in the works of Zittel, Lyell, Marsh and Weller. Since the early days this science has made rapid progress until now its devotees are numerous, and they attempt to solve some of the most important problems bearing upon the origin and evolution of organisms, and upon the ancient life-history of the earth. The study of palæontology is carried on by means of fossils (q.v.) which, defined in the words of Zittel, are "all remains or traces of plants and animals which have lived before the beginning of the present geological period, and have been preserved in the rocks," and hence the successful pursuit of this science is in large degree dependent upon intimate knowledge of the closely allied sciences, geology and biology. This affiliation of palæontology to the two sciences mentioned is easily traced in the literature. The early works were descriptions of fossils, often arranged, as in Sowerby's 'Mineral Conchology,' 1812-45, without reference to their biological classification or to their relation as members of the fauna of a particular formation. In later works the tendency to diverge along two distinct lines is very apparent and at the present day we have two more or less widely separated schools of palæontologists: (1) those whose work is more intimately associated with that of the geologist; and (2) those who are essentially biologists. The former (stratigraphers, palæontologic geologists, geological biologists) are more interested



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in unraveling the relations of fossils to the rocks in which they are found entombed, in studying the order of succession, the evolution, and migration of fossil faunas in the stratified rocks, in developing the use of index fossils, that is, of particular genera and species of fossil plants and animals as indicators of particular geological formations; and, by the study of the geographic distribution of fossil faunas, in solving the problems of "facies development," and of palæogeography or ancient physical geography. The second group of palæontologists confine their attention almost wholly to description of the morphology, embryogeny, and phylogeny or genealogy of fossil organisms, and give only incidental notice to the geologic associations of the fossils they handle.

Palæontology has been of great aid to zoology and botany in clearing up mooted questions of classification, in explaining the origin of various obscure structures seen in modern plants and animals, and in adding to our knowledge of the determining factors of geographic distribution. The strictly utilitarian side of palæontology, involving the application of a knowledge of index fossils to determination of the proximity of beds of ore, coal or building stone, or to ascertainment of the depth of oil, gas, or water-bearing strata, has not yet been accorded due recognition by those most interested in the exploitation of such economic materials, with the result that large sums of money have been expended in fruitless search for non-existent treasures.

The rocks of the earth's crust are classified according to their periods of origin into four great groups, each of which represents an era of immense duration, measured in millions of years. These eras are again divided into periods, represented by systems of rock formations, of which 13 are generally recognized, and the periods are again subdivided into epochs, ages, stages, and episodes, each of these smaller elements being represented by its corresponding rock-unit. With exception of the Archæan and Algonkian systems at the bottom of the scale, from which no satisfactory fossil remains have yet been obtained, each of the systems has been found to contain an assemblage of fossil organisms quite peculiar to itself, and not found in its entirety in any other system. This assemblage of fossil organisms in any system or in any geological formation constitutes its fossil fauna, which is an imperfect synopsis of the ancient life that formerly inhabited the vicinity of the ocean, lake or land basin in which the particular system or formation originated.

The faunas of two formations of consecutive age have as a rule many species in common, and on the other hand the faunas of two formations representing widely separated periods of time are found to be quite unlike, and to have few species and even few genera in common. The two extremes of such dissimilarity are naturally seen in the Cambrian and Pleistocene faunas at opposite ends of the geologic time-scale.

While formations of different ages contain diverse faunas, it is found that a single formation presents essentially the same fauna in all portions of its area of distribution, whence it follows that the fossil contents of a formation are, in general characteristic of that formation, and that they serve as a means of identifying it in widely separated districts.

TABLE OF SYSTEMS, PERIODS, AND EPOCHS, WITH  
DOMINANT TYPES OF LIFE.

Eras	Periods and Systems and Dominant Types	Epochs
Cenozoic Era of Vertebrates 3 million years	Quaternary (Man, Lamellibranchs)	Recent Pleistocene
	Tertiary (Mammals, Gastropoda, Insects, and land plants)	Pliocene Miocene Oligocene Eocene
Mesozoic Era of Reptiles 7 million years	Cretaceous (Pterodactyls, Dinosaurs, Echinoids)	Upper Lower
	Jurassic (Dinosaurs, Crabs, Ammonites)	Upper Middle Lower
	Triassic (Amphibia, Ammonites)	Upper Middle Lower
	Permian (Amphibia)	Upper Lower
	Carboniferous (Land plants, Crinoids)	Coal measures Subcarboniferous
Palæozoic Era of Invertebrates 18 million years	Devonian (Fish, Goniates, Corals)	Upper Middle Lower
	Silurian (Crinoids, Corals, Eurypterids)	Upper Middle Lower
	Ordovician (Graptolites, Orthoceratites, Trilobites)	Upper Middle Lower
	Cambrian (Trilobites)	Upper Middle Lower
Eozoic 18 million years	Algonkian	Life not well known
Azoic 10 million years	Archæan	No evidence of life.

These general laws are subject to certain exceptions due to the influence of "facies development," the variations of faunal expression consequent upon changes in the physical and biotic conditions of life. These facial changes, when understood, assist rather than render more difficult the correlation of distant faunas, and their elucidation greatly aids the restoration of the ancient physiographic conditions.

Comparison of the successive fossil faunas with each other and with the modern fauna shows that there has been a slow but continuous progress in the expression of each fauna from that of Cambrian age with its unfamiliar lowly primitive types, to the highly organized animals and plants that form the dominant types of the modern fauna and flora. This progress is manifested in the successive members of the different races of animals that have descended from Cambrian ancestors, by their passing through a particular stage of evolution in each successive period, epoch, and stage. Recognition of this stage of evolution enables the palæontologist to correlate entirely new faunas or species with the known faunas of standard sections or scales.

It must not be inferred that all races living at the present day have descended from Cam-

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brian ancestors. Many of our well differentiated forms of modern life can be traced back only to the beginning of the Tertiary, or into the Mesozoic, or perhaps late Palæozoic, where they are represented by species whose distinguishing characteristics are less well developed so that they can scarcely be separated from contemporaneous ancestors of other races. Such early ancestral types which seem to possess in potential state the characters of two or more later descendant races are known as "generalized types."

There are also numerous groups of fossil organisms that appeared during early days, multiplied, attained their climax, during which they were for a time perhaps the dominant forms of land or sea, and then declined and eventually became totally extinct. Such extinct groups, like the nummulites, graptolites, cystoids, blastoids, long-hinged brachiopods, orthoceratites, ammonites, belemnites, and trilobites among invertebrates; ostracoderms, stegocephalians, mosasaurs, ichthyosaurs, dinosaurs, pterodactyls, uinatheres among vertebrates; and the lepidodendrids, calamites, sigillarias, tæniopterid ferns, and cordaites among plants, are eminently characteristic of the periods in which they lived.

### *Facies Development and Faunal Changes.*—

Facies is the peculiar expression of the physical and faunistic characters of a formation at a particular point, and it is determined by the combination of climatic, physiographic, bathymetric and other conditions reacting upon the organisms of the neighborhood. Some formations, like the Devonian, present several varied facies in a limited area; others, like certain deep-water limestones of Ordovician and Carboniferous age, spread with scarcely any change over vast spaces. The chief types of facies are the littoral, corallitic, sub-littoral or pelagic, abyssal, estuarine, fresh-water, and terrestrial. The characteristics of each of these, with the organisms peculiar to it, are here passed in review.

A "littoral" facies is represented by deposits formed at the shore and in the shoal water contiguous to it. It comprises conglomerates, sandstones, shales, and marls, and its organic contents consist of the remains of animals and plants of beach and shallow water habits. Such are the heavy-shelled mollusks, notably those that feed on marine plants, also abundant worms, heavy-shelled crabs, acorn barnacles, and hydroids. This facies is more common than any of the others, for the larger part of the sedimentary rocks have been made up of the products of continental erosion deposited near the coast.

Fossil coral reefs have been recognized in formations of nearly all ages and constitute a "corallitic" facies. They are in all cases of shallow water origin, and their presence in ancient rocks has been generally accepted as evidence of the uniformly warm temperature of the seas in which they flourished. In the ancient reefs the coral structure has usually been obliterated by a metamorphic process called diagenesis, and the coral rock has become a dolomite. Such are the Guelph dolomites of the Silurian of New York and Ontario. Fossil coral reefs often afford faunas of many species and abundant individuals. The corallitic facies of a formation is always associated, on its landward side, with a sparsely fossiliferous lagoon or saltmarsh phase, represented by red shales,

containing gypsum and salt, by water-limestone, etc., as in the Salina beds of New York, and on the seaward side by a series of highly fossiliferous beds, usually limestones or calcareous shales, which correspond to the deposits of the open ocean. These latter deposits usually abound in fossils of distinct pelagic type, such as cephalopods, brachiopods, sea-urchins, crinoids, crustaceans and thin-shelled mollusks.

"Sub-littoral" or "pelagic" facies comprise the deposits laid down in the deeper water of the continental shelf, and form an intermediate phase between the littoral and abyssal types. The rocks are mostly of organic origin (limestone and lime shales), with fine-grained sandstones and clay shales. As a rule they contain an abundance of well preserved fossils, including the remains of all kinds of animals that inhabit the open sea, together with some members of the littoral fauna. Deposits of this class, with their characteristic faunas, such as graptolite shales, ammonite and pteropod limestones, have often very wide distribution, and are hence of great value for determination of geologic horizons.

"Abyssal" facies is the type characteristic of the greatest depths of the ocean. It is represented in modern time by the foraminiferal and radiolarian oozes, and by green and red muds. It is recognized among ancient rocks by radiolarian cherts of Palæozoic and Jurassic age of Europe and Australia, by the chalk of Cretaceous age of Europe and North America, and by the Pliocene Barbados earth, which latter is evidence of upheaval of great ocean-depths in comparatively recent times.

The three remaining types of facies, "estuarine," "fresh-water," and "terrestrial," are associated with spread of continental conditions. The estuarine or brackish water facies presents lagoon, bayou and estuary deposits of sandstones, conglomerates, and clay shales, sometimes alternating with limestones formed during temporary transgression of the ocean. The fossils of such deposits are species of animals that lived in brackish water, mingled with remains of the fresh-water and land fauna and flora that were carried down by river waters and entombed in the estuarine deposits. The nodular shale of Carboniferous age at Mazon Creek, Ill., is a renowned example of this type of facies. Its varied fauna comprises amphibians, fish, clams, river-snails, land-snails, scorpions, spiders, myriopods, insects, and crabs, together with abundant ferns.

"Fresh-water" and "lacustrine" facies are deposits formed in fresh-water swamps and lakes, important in the Devonian, Carboniferous, Jurassic, and Tertiary systems. The Devonian deposits, known as Old Red Sandstone in Europe and as Catskill sandstone in the United States and Canada, consist mostly of red and gray sandstones and shales containing fish and plant remains. The swamp deposits of Carboniferous and later times are represented by beds of coal, lignite and clay shales, all containing abundant plant remains, and rarely relics of the insect, crustacean, and vertebrate life. During the Cretaceous, Jurassic, and Tertiary Periods, extensive lakes existed upon the several continents, and their sandstone, shales, and limestone deposits have afforded hosts of vertebrate and vegetable remains, specially those of the Rocky Mountain region, and Europe. Occasional beds of this

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facies abound in fresh-water snails and insects, as notably at Florissant, Colo. Angular breccias, conglomerates, sandstones, shales, and clays comprise the deposits of the terrestrial facies, a type which has not yet been satisfactorily investigated in all its phases. The various deposits originated either as the residuals from denudation, or as flood-plain, desert and prairie deposits. They are important sources of fossils in some cases (flood-plain and prairie phases) but as a rule their mode of origin has not been conducive to preservation of organic remains.

All of these facies are being developed in different parts of the world at the present day, and geologists find that they have been developed more or less completely during all periods of geologic time. It is, however, worthy of note that the various marine facies greatly predominated in the older Palæozoic, that the estuarine and swamp conditions were markedly developed during Carboniferous time in most parts of the world when they were associated with a remarkable increase of swamp vegetation, and that the lacustrine or fresh-water deposits were prominent during the Devonian and again during the Tertiary Periods. Each of the above mentioned types of facies has its peculiar faunal or floral aggregation of fossils, and study of these features of any formation enables the palæontologist to determine the distribution of the land and water bodies, and even to form some imperfect ideas regarding the nature of the climate, the topography of the land areas, and the character and distribution of the fauna and flora of each successive epoch and episode of time.

*Palæontology and Evolution.*—The researches of palæontologists upon the order of succession of fossil organisms, and upon the various modes of development of certain types from their embryonic to their adult stages, have brought to light many facts supporting the doctrine of evolution, and have also demonstrated the origin and mode of evolution of many races of living and extinct organisms. The results of these investigations along lines of profound interest may be found in the works of Beecher, Bernard, Clarke, Cope, Hyatt, Jaekel, Jackson, Koken, Neumayr, Packard, Schuchert, Scott, Smith and Williams whose more important contributions are cited in the bibliography at the close of this article. See EVOLUTION.

*Periods of Geologic Time and their Faunas.*—The following sketch of the series of extinct faunas that have succeeded each other as inhabitants of the waters and lands of the earth involves an elementary knowledge of the most important types of animals and plants. (See preceding Table of Systems, etc.) The history actually begins with the close of pre-Cambrian (Algonkian) time when the distribution of land and water was very different from what it is now. Regarding the life of the Archæan we know nothing and of that of the Algonkian very little. Many rocks of the latter system were originally of sedimentary origin, but they have been so thoroughly metamorphosed that few traces of their organic contents remain. The remnants discovered are of types similar to those of the succeeding Cambrian fauna, and include worms, linguloid brachiopods, and arthropod remains, some of which are referred to the *Eurypteridæ*. The extensive graphite deposits of the pre-Cambrian rocks are by some authors

considered as evidence of original organic deposits.

Those genera and species marked with an asterisk (or italicized) are indicial, that is, characteristic of the formations under which they are mentioned; fossils not so marked may be understood to occur in other periods as well.

*Cambrian.*—The Cambrian system is represented mostly by littoral and shoal-water deposits containing an abundant fauna, which, while of primitive type, is remarkable on account of its high degree of differentiation. Some of the Cambrian rocks, notably the calcareous shales, in regions of slight metamorphism (New Brunswick, Newfoundland, and Scandinavia) abound in fossils. Elsewhere the sandstones, conglomerates and limestones are poor collecting grounds. This fauna, estimated to contain 1,000 species, comprises representatives of all the seven sub-kingdoms of invertebrate animals, and of 12 out of 30 classes. The entire fauna is marine, and the dominant types were trilobites, inarticulate brachiopods, and hyolithoid shells usually referred to the pteropods. The trilobites form the most interesting elements of the fauna. Compared with those of later times they are more loosely built, and they present many features indicative of primitive types; characters which are seen only in the embryos of later forms. Among the more important are the minute blind *Agnostus* and *Microdiscus*; the spiny *Olenellus*, *Mesonacis*, *Holmia*, characteristic of the lower Cambrian; *Paradoxides*, which contains some of the largest known trilobites, indicial of the middle Cambrian; and the flat-shelled *Dikellocephalus* of the upper Cambrian. The brachiopods, of which 120 North American species are known, are almost entirely of the inarticulate type, with thin, rounded or spatulate, phosphatic shells, while there were a few members of the articulate group with transverse, calcareous shells. The hyolithoid shells, with triangular elongate form, are abundant. Sponges of the hexactinellid type with net-work of silicious spicules are recognized in Protospongia. The corals are doubtfully represented by *Archæocyathus*, and the echinoderms by a few rare cystoids. Among the gastropods there are coiled shells referred doubtfully to *Platyceras* and *Raphistoma* in the upper Cambrian, and limpet-like forms, *Scenella*, and *Palæacmæa* in the middle and upper horizons. The lamellibranchs have a single minute genus *Fordilla*, and the cephalopods likewise the minute *Volborthella*. Worm trails and burrows are abundant, and various forms of ostracods (*Hipponicharion*) are found in the finer grained sediments. Radiolarians and foraminifera have been found, some of the latter (*Orbulina universa*) being indistinguishable from modern species. The only probable plant known is *Oldhamia*, referred to the coralline algæ.

The Cambrian fauna in its entirety shows a very advanced stage in the differential evolution of organic types, and there is good reason to believe that long ancestral lines of fossil organisms originally existed in the pre-Cambrian sediments, and further to anticipate that continued search in the less metamorphosed deposits of that remote age will eventually bring to light some of those much sought for initial types.

*Ordovician.*—The fauna of the Ordovician, or age of graptolites, shows a marked advance in development of all its types over those of the

Cambrian. It also shows a more distinct separation into facies, of which the pelagic, embracing orthoceratite, brachiopod, and trilobite limestones, and the graptolite shale facies are the more prominent. Most of the groups of animals which were initiated in the Cambrian, enjoyed a rapid evolution in the Ordovician time. During that period the trilobites attained their climax in respect of variety and numbers, and were represented by \*Asaphus, \*Trinucleus, \*Remopleurides, \*Pterygometopus, and by others that extend up into the Silurian. The Ordovician trilobites present considerable advance over their Cambrian ancestors in respect of increased compactness of structure, perfection of the eye-structure, and elevation of the visual surface above the head, whereby the efficiency of these organs must have been much increased. The cephalopods are represented by numerous orthoceratite genera, with straight or slightly curved shells, some of which were of great size. Orthoceras, \*Cameroceras, \*Goniceras, \*Piloceras, \*Nanno, etc., are associated with closely coiled genera \*Trocholites, and other related types that closely resemble nautilus shells.

Among the brachiopods the inarticulate types, so common in the Cambrian fauna, occupy a subordinate place, and are represented by numerous species of Lingula, \*Trematis, and \*Siphonotreta. The articulate order attained so great an expansion that 325 species of North American Ordovician brachiopods are known. The Polyzoa appear first in the lower Ordovician and are abundant and varied in the upper zones. Gastropods are common, and all have holostomatous shells. Lamellibranchs are common, with several genera of generalized type; corals of various types are common. The hydroid corals (Stromatoporids) formed extensive reefs during Chazy and Trenton time. Echinoderms include abundant cystoids, several crinoids, and rare starfishes and ophiurians. The cystoids are specially abundant in the lower Ordovician, where their fragmentary remains form solid limestone beds of several feet thickness. Sponges allied to Protospongia, and to the modern hexactinellids, are common in a few localities, and in the Trenton limestone of the Mississippi Valley are found the curious digitate \*Brachiospongia, the nodulose \*Strobilospongia, and the much discussed \*Receptaculites. A pelagic facies is recognized in the radiolarian cherts of Great Britain, France, and Germany. The graptolite facies of the Ordovician, by some authors considered to be an abyssal facies, occurs in the form of gray and black bituminous shales and slates, in which numerous genera and species of graptolites are found arranged in definite zones that occupy the same relations to each other in widely separated parts of the world. This great dispersion, and regular succession of genera and species render the graptolites the most important index fossils for the Ordovician, an advantage which is, however, somewhat negated by the difficulty attending their study. The group began in the upper Cambrian, attained wide distribution and various evolution during the Ordovician, and declined during the Silurian. These graptolite beds are well demarcated from the molluscan and brachiopod limestones and while they occur between the latter at various horizons throughout the general Ordovician and Silurian formation scales of Europe and America, they are best developed in basins

where little of the other facies seem to have existed. The faunas of latest Ordovician time are known in only a few regions, since that period was one of comparatively sudden uplift of continental masses, accompanied in many parts of the earth by formation of mountains. But the few late remnant faunas that found shelter in protected basins present a transitional phase between the normal Ordovician and the succeeding Silurian faunas. Late Ordovician time is represented in most parts of North America by a marked hiatus of unconformity indicating wide land areas.

**Silurian.**—The earliest Silurian fauna of North America, that of the Clinton group, contains a few relicts of the Ordovician fauna lingering on among a host of new species and genera, which were introduced with the return of marine conditions over the interior sea basin. The American rocks and faunas of Silurian time indicate: first, muddy waters of the Clinton epoch, followed by clear seas of Niagara time inhabited by a luxurious fauna, and in which pure organic limestones were deposited. Subsequently the shallow mediterranean Guelph sea of America became dotted with extensive coral reefs, and toward the end of Silurian days the epicontinental seas were again largely drained to form lagoons, tidal mud-flats, and salt lakes of Salina time. Then ensued a short period of wide land-emergence before the early Devonian transgression began. Facies development is well marked and it is worthy of note that the various facies occur in the same relative order and at equivalent horizons in widely separate regions; evidence that the causes which influenced their development in Silurian time acted simultaneously during successive epochs over the entire northern hemisphere. The mollusk-trilobite limestone of Niagara age in North America, is duplicated by that of similar age in England (Wenlock), Sweden (Gotland), and central Europe (Bohemian). The Eurypteris fauna of the Salina group of New York is duplicated by the contemporaneous water-limestones of the English Ludlow, and the Baltic Rotzikküll beds. The coralline facies of the American Guelph is of the same age and character as that of the English Dudley, Swedish Gotland, and Bohemian dolomites; and finally the Monograptus shales of Great Britain, Bohemia, Brittany, Scandinavia, and New York are all of lowest Siluric age. Another interesting feature of the Siluric fauna is its division into two well-marked types—a northern or Baltic-British-American type, and a southern Bohemian-Mediterranean phase, the species of which are quite distinct. All of the Siluric faunas of North and South America and of Asia are of the northern phase, and the Bohemian-Mediterranean type appears to be merely a local facies. It is of interest that the Silurian fauna of Australia contains representatives of both types.

The chief characteristic of the Silurian fauna is the great evolution of the crinoids, corals, and spire-bearing brachiopods, and Eurypteridæ. Protozoa are rare; sponges and corals attain a remarkable variety and abundance, and in many districts the latter formed extensive reefs. The principal genera are: Favosites, Alveolites, \*Halysites, Heliolites, Cystiphyllum, Acervularia, Omphyma, Zaphrentis, Cyathophyllum, \*Palæocyclus, and the operculate pyramidal genus \*Goniophyllum. The graptolites begin to de-

cline. Cystoids take second rank after the crinoids, whose sudden expansion is expressed in the ratio of about 450 Silurian species to less than 50 from the Ordovician. The brachiopod fauna, while no larger, differs from that of the Ordovician in the increase of the spire-bearing types, and in the remarkable development of inarticulate types with large solid shells. Lamellibranchs offer no important changes, all the genera being still of integripalliate types. Gastropods are numerous. Tentaculites, usually referred to the pteropods, occur by myriads associated with ostracods. The Silurian Cephalopoda comprise straight-shelled Orthoceras, curved Cyrtoceras, turreted Trochoceras, and coiled Nautilus; also Gomphoceras and Phragmoceras with their restricted apertures, and the aberrant genus Ascoceras.

The Arthropoda are represented by rare barnacles, numerous ostracods, some phyllocarida, rare scorpions, spiders, and insects, as well as by the trilobites and eurypterids. The trilobites show a slight decrease in numbers, but a greater diversity of form over their Ordovician ancestors. The water limestones (of mud-flat origin) of the Salina of New York and equivalent European deposits afford abundant remains of Eurypterus (q.v.), Pterygotus, and \*Hughmilleria, some of which grew to be six feet long. These creatures resembled in habits and structure the modern horseshoe crab (*Limulus*). Rare scorpions, spiders, and insect remains have also been found in these uppermost Silurian lagoon deposits, and they show no very great differences from similar types of the Carboniferous. Their presence indicates the existence of terrestrial life on the extensive continental areas that emerged toward the end of Silurian time. In these highest Silurian rocks, specially in the Ludlow beds of England, Scotland, and Podolia, are found the earliest remains of vertebrate animals in the shape of primitive fish-like creatures of the order Ostracodermi (q.v.).

*Devonian.*—The Devonian Period was one of constant local physiographic changes, and accordingly its formations and faunas present a greater variety of facies than is seen in any of the older Palæozoic systems. There are two prominent types of the Devonian, each with its distinctive fauna: (1) The marine deposits, of limestones, marls, shales, and sandstones; (2) the continental or terrestrial phase, known as the Old Red sandstone in Europe and as the Catskill shales and sandstones in the eastern United States and Canada. This two-fold aspect of the deposits is more or less prominent in all the geological systems above the Devonian. The Devonian fauna as a whole is distinguished by the development of land vegetation, by rapid evolution of fishes, lamellibranchs, and of goniatite cephalopods, and by the decline of trilobites, and practical extinction of the graptolites and cystoids. Other groups expanded. Hexactinellid sponges (\*Dictyospongia), comparable with the modern Venus-flower-basket, flourished in shallow seas, corals are abundant and formed reefs in many regions. The Hydrozoa are represented by numerous reef-building stromatoporas, and by straggling survivors of the graptolites. Among echinoderms, the cystoids are rare; starfish and ophiurians occur commonly at a few localities; and the crinoids are the dominant types of this

class, though not so abundant as in the Silurian. The blastoids are represented by *Elæacrinus*, characteristic of the Onondaga limestone. Worm-trails are common in the shales and sandstones of the middle and upper Devonian. A host of new brachiopods appears, while many Silurian genera run on. The spirifers manifest a marked tendency to develop forked plications and to lengthen the cardinal lines of their shells. Lamellibranchs show a great advance over those of the Silurian, and in certain shale and sandstone formations they outnumber all other types of organisms. Gastropoda of the family Capulidæ are abundant, and minute pteropod shells (*Styliolina* and *Tentaculites*) often form solid limestone beds. Among cephalopods a new type of closely coiled shells, *Goniatites*, with slashed sutures, appears in the lower Devonian, evolves rapidly and reaches its climax before the close of the period. An extinct group of crustaceans, the *Phyllocarida*, with long strong caudal spines, reach a considerable development, especially in the Hamilton epoch. Eurypterids are rare, though represented by the gigantic *Stylonurus* in the Catskill beds. The trilobites have many large and bizarre members, as well as a number of small, degenerate forms, during the early and middle Devonian, when they manifested a strong tendency to develop spines along the margin and on the surface of the carapace.

The Devonian is aptly termed the "age of fishes," for within its limits this class enjoyed a great expansion. The lowest Devonian fish fauna is like that of the upper Silurian with numerous Ostracoderms. This is succeeded by a fauna with \**Holoptychius*, \**Pterichthys*, *Bothriolepis*, \**Coccosteus*, *Dinichthys*, *Dipterus*, and a large number of acanthodian sharks, which are indicated by their spines. No remains of any vertebrates higher than fishes are known in the Devonian.

Plant remains in the form of marine algae are found throughout the Devonian. Some of these, like *Nematophyton* of gigantic size, were long supposed to be the trunks of coniferous trees. Others with delicately branching fucoid leaves are common, especially in the Hamilton, Portage, and Chemung groups. The continental phase of the Devonian has afforded the earliest examples of land vegetation, all prophetic of the succeeding Carboniferous types. Both the fauna and flora of the upper Devonian show marked affinities by gradual transitions to those of the Subcarboniferous. See PALÆOBOTANY.

*Carboniferous.*—The early part of the Carboniferous period was marked by a continued recession of the sea, which had begun in late Devonian time, and during the Carboniferous the land areas seem to have reached a greater expansion than they have at the present day. These Carboniferous land masses were of very different form and situation from the present day continents. An Arctic continent occupied the greater part of the Arctic zone and extended by broad peninsulas southward toward the equator, over what are now eastern America, eastern Asia, central Europe, and the eastern Atlantic Ocean. Another, Indo-African continent, covered that part of South America east of the Andes, extended across the south Atlantic, Africa, the Indian Ocean, and Australia. An ocean spread over the present Pacific basin and also over Alaska, all of the United States west

of the Mississippi River, Central America and the western part of South America; while a great mediterranean sea of irregular form encircled the globe and communicated at both ends with the Pacific Ocean. There was also a small Antarctic sea. Toward the close of Carboniferous time the ocean again transgressed and the land masses became for a time somewhat reduced in size. The Carboniferous formations consequently present two well-marked facies: a marine facies with deposits of limestones and shales with mollusks, brachiopods, corals and foraminifera, more widely spread in the lower and upper Carboniferous; and a continental phase of sandstones, shales, and coal-beds, holding abundant plants, and in some localities numerous insects, fish and amphibians. These facies as a rule occupy different basins, but occasionally they are found dovetailed into each other in such manner that their relative ages can easily be determined. The lands of Carboniferous time and especially the coastal swamps supported a dense and rank vegetation comprising more than 1,500 species of plants. Ferns, some of great size, were the most common type. Calamites with fluted many-branched stems and variform foliage, were giant predecessors of our modern horse-tail rushes (*Equisetum*). *Lepidodendron* and *Sigillaria*, related to clubmosses (*Lycopodium*), with trunks often five feet thick and 75 feet high; *Cordaites* with sword-shaped yucca-like leaves on a solid trunk 25 to 30 feet high; and other great tree-like plants intermediate in nature between the ferns and cycads, formed the bulk of the forest growth. In the shelter of these forests lived numerous insects, mostly primitive cockroaches, also dragon-flies, one of which (*Meganeura*) had wings over 20 inches across; primitive forms of locusts, crickets, grasshoppers and also scorpions that were much like those of modern type. On the shores of the swamps lived large amphibious myriopods whose bodies were armed with branching spines. Some land snails like modern *Pupa* and *Zonites* have been found. The fresh-water facies also contain remains of lizard-like amphibians (*Stegocephalia*), many of which have been found in hollow *Sigillarian* stumps.

The marine phase of the Subcarboniferous contains the first abundant foraminiferan deposits. Minute *Endothyra* shells form the bulk of the Indiana oolitic limestone; *Fusulina*, like grains of wheat, and *Schwagerina*, a globular form, build great limestones in the upper Carboniferous. Corals are not so abundant as in the Devonian and coral reefs are rare. *Lithostrotion* is the characteristic American genus. The *Stromatoporan* hydroids are wholly wanting. Crinoids were locally very abundant, especially in the Subcarboniferous beds at Burlington, Keokuk and Crawfordsville in the Mississippi Valley, where about 650 species have been found. The blastoids, with *Pentremites* as their most abundant type, attained their climax in the Subcarboniferous of America. Among the abundant bryozoa, one genus *\*Archimedes*, with its screw-like axis, is a good index fossil of the Subcarboniferous. The characteristic brachiopods of the Carboniferous are *\*Productus*, *Chonetes*, *\*Derbyia*, *Spiriferina*, *Marginifera*, *Meekella*, *Enteletes*. Lamellibranchs are abundant; *Gastropoda* present a number of heavy-shelled forms; among the *Cephalopoda* the

orthoceratites have greatly declined; nautiloids abound, and the goniatites show great advancement over those of the Devonian, and toward the end of the period transitional types suggestive of the Triassic ammonites appeared.

The arthropod fauna of the Carboniferous is poor in trilobites, eurypterids are common in some coal measure shales, the malacostracan crustaceans show some progress, and the phyllopods *Leaia* and *Estheria* are found in fresh-water deposits between coal beds.

The Carboniferous vertebrate fauna is of interest by reason of the sudden expansion of amphibian types in the upper part of the system. The *Stegocephalia* (labyrinthodonts) are represented by several genera, and consist of generalized types suggestive of the later crocodiles, lizards and snakes. The fish-fauna is abundant, comprising sharks and ganoids. The Waverly shales of Ohio have afforded numerous large lungfishes (*Dinichthys*) and some fine examples of acanthodian sharks (*Cladoseleache*). Over 600 species of fish have been described from the Subcarboniferous limestones of America.

**Permian.**—During Permian time the continental conditions were even more prevalent than during the Carboniferous, and accordingly the marine phase is much restricted in distribution and its fauna diminished in numbers. Both plants and animals are transitional between those of the Carboniferous and Triassic. Many types characteristic of the Palæozoic have their last representatives, some of them, it is true, occurring abundantly, in the rocks of this system. *Productus*, *Bellerophon*, *Orthoceras*, *Cyrtoceras*, goniatites, trilobites and the fenestellid bryozoa, which latter formed extensive reefs in Europe, all become extinct with the close of the Permian. Other types, some of them initiated during the Carboniferous or earlier and continued into the Trias attain a considerable expansion, and give to the fauna a decided Mesozoic aspect. These are found among the lamellibranchs as well as among the ammonoids, fish and amphibians. The Ammonoidea attained a great expansion; and we see together with the simpler goniatite genera the forerunners of the more complex ceratites and *Arcestidae* of the Trias, and also the eminently characteristic genus *\*Medlicottia*. The fish fauna of the Permian consists mainly of heterocercal ganoids. Acanthodian sharks reached the climax of their evolution. The stegocephalian amphibians, among which *\*Branchiosaurus* and *\*Archegosaurus* are the best known, were varied and common, and were the dominant types of life. There were also snake-like members of this group, one of which, *Palæosiren*, was nearly 45 feet long. A new type of vertebrate appears in reptiles of land and fresh-water habits. Rhynchocephalians are represented by lizard-like *\*Palæohatteria*, and the peculiar spiny *\*Naosaurus*, and *\*Dimetrodon*.

While the Permian flora is in general the same as that of the Carboniferous it contains some types not seen in the latter—broad-leaved ferns, *Glossopteris*; the conifers *Walchia* and *Voltzia*, and the cycad *Zamites*, which give to the flora a strong Mesozoic expression.

**Mesozoic.**—The Mesozoic fauna and flora are distinguished from those of the Palæozoic by the absence of trilobites, graptolites, orthoceratites, long-hinged brachiopods, tetracrallic and tabu-



late corals, cystoids, palæocrinoids, blastoids, phyllocarid crustaceans, eurypterids, palæoconch lamellibranchs, goniatites, acanthodian sharks and placoderm fishes, and the great lycopods. On the other hand this era is marked by the introduction of numerous new types and by the expansion of many invertebrate groups, land and marine reptiles, multituberculate mammals, and cycads and conifers. During the era a great change in the expression of the life is apparent, in that the early Triassic life presents close analogies with that of the late Permian, while during the era an almost complete change takes place, and that of the upper Mesozoic, especially the vegetation, affords considerable resemblance to the early Tertiary. The wide extension of continental areas continued from Permian into Triassic time with perhaps a slight increase, and in North America marine Triassic fossils have been found in only a few places in the far West. The fauna as a whole is an impoverished one. The continental Trias, consisting of red beds in America, Europe and Asia, contains abundant remains of ganoid fish (\*Semionotus) together with some cycads and conifers. In some regions these beds have afforded also numerous remains of often gigantic stegocephalian Amphibia, which attained their climax during this period. Small amphibious precursors of the large marine Jurassic ichthyosaurs and plesiosaurs are found in \*Lariosaurus, \*Nothosaurus and others. The Theromorpha, reptiles exhibiting remarkable affinities with the carnivorous mammals, attained a great development in South Africa. The first turtles, crocodiles, and dinosaurs occur here. The earliest mammalian remains consist of fragmentary jaws and multituberculate teeth of small animals supposed to be allied to the modern monotremes: Microlestes, Triglyphus in Europe, and Dromatherium and Microconodon in North America.

The marine Trias is found well developed in the Alps with extensions into Asia Minor, India, Arctic regions, Pacific States and Australia. The number of species is comparatively small, though individuals are abundant. Foraminifera and calcareous sponges abound. Corals of perforate and aporose genera formed extensive reefs in some regions. Crinoids are represented by the eminently characteristic \*Encrinurus liliformis, and echinoids by the regular sea-urchin Cidaris. Among the brachiopods are a few remnants of Palæozoic genera, while the families Terebratulidæ, Rhynchonellidæ, and Koninckinidæ are surprisingly developed. The lamellibranchs begin to show considerable expansion, and the first true fresh-water unios appear here. The marine gastropod fauna is abundant, with some old types and others of later Cretaceous and Tertiary aspect. The ammonites, which began in the Permian, show a wide differentiation of form and complexity, and attain the culmination of their evolution in the upper Trias. Over 1,000 species have been described. Ostracods are abundant, and a true macruran decapod, Pempix of the Muschelkalk, reminds one of the modern crayfish.

**Jurassic.**—The facies development of this system is very varied; the continental phase predominates in America as the Newark or Connecticut River sandstones, while the marine phase is most prominent in Europe and Asia. The Jurassic flora is quite similar to that of the Trias, made up of cycads and conifers which are fore-

runners of the recent pines. Among marine invertebrates the sponges and corals, largely of modern type, were so abundant as to form great reefs. Crinoids were abundant in individuals, though genera and species were few; echinoderms and Bryozoa were common, while the brachiopods were restricted to a few families. The lamellibranchs and gastropods include the first representatives of a number of modern families. The ammonites are by far the most abundant and characteristic forms of mollusks, and by means of them the marine Jurassic of Europe has been subdivided into some 15 zones, each characterized by its particular species. Belemnites, the solid cigar-shaped internal shell of squid-like dibranchiate cephalopods, are very abundant and varied, and the fossilized ink-bags of these creatures are common in some formations. The crustacean fauna shows a great increase of long-tailed decapods allied to prawns, shrimps, and crayfish, and the earliest true crabs. Insects include dragon-flies, May-flies, termites, grasshoppers, crickets, walkingsticks, and some beetles; also occasional bugs, flies and ants. The ganoids with heterocercal tails take a subordinate role, while those with homocercal tails and scaly rhombic plates predominate. Sharks and rays and the first teleost fishes complete the Jurassic fish fauna.

The reptiles form the most interesting group of the Jurassic fauna, for during this period they reached the highest stage of their evolution both in variety and abundance. The Triassic stegocephalians and Theromorpha give place to the terrestrial dinosaurs and the marine ichthyosaurs and plesiosaurs. The latter held somewhat the same relation to reptiles that the whales of modern time hold to the mammals. Those sea lizards swarmed in the Jurassic seas where they preyed upon the fish. The dinosaurs held sway upon the land, not only during the Jurassic Period, but also during the greater part of the succeeding Cretaceous. Another type of reptile prominent during Jurassic time, and continued into the Cretaceous, was the group Pterosauria or flying lizards, of which the pterodactyl is the best known example. Other types of reptiles, as turtles and crocodiles, are more or less common. At the same time when the reptilian stock developed flying creatures there appeared the earliest known bird. (See ARCHÆOPTERYX.) The mammalian remains of Jurassic time are known only by isolated teeth and jaws of small size and very rare, and all are related to the marsupials and monotremes.

**Cretaceous.**—The flora of the lower Cretaceous is like that of the Jurassic, but gradually the cycads diminish in importance and a host of angiosperms appear, very similar to the trees and shrubs of to-day. Many genera of recent tropical and temperate zone plants occur in the Cretaceous rocks of Greenland and northern Europe, facts cited as evidence of the mild climate of those parts during Cretaceous time. The ammonites begin to decline and we see numerous degenerate types, last members of various races, with shells loosely coiled, turreted, hook-like, or even straight, many of which are characteristic index fossils. The group becomes entirely extinct with the close of the Cretaceous.

The close of Cretaceous time terminated the middle or Mesozoic period of the history of organic life, and marked the extinction of a number of types of animals which had for long

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epochs dominated the lands and seas. This extinction is perhaps more evident here than at the end of the Palæozoic, and its causes are wholly unknown. It is true that some groups (Ammonites) had already begun to show marked degenerate tendencies attendant upon race senility, but the majority of the groups became extinct at the height of their evolution, when they were represented by their most highly specialized types. It is possible that this very specialization rendered them more liable to injury by slight though abrupt climatic changes or by sudden variations in the depth of the seas in which they lived. The great land and marine reptiles, the flying lizards, the mesosaurs and toothed birds all became extinct. Likewise the ammonites, belemnites, rudistæ, and the pharetrone sponges, so characteristic of the Mesozoic, have not been found above the upper limits of that system.

*Cenozoic.*—The life of this era is like that of recent time, particularly the marine life, for the terrestrial mammalian life of a large part of the system is very dissimilar to modern animals. The early classification of this system was based upon the increasing percentage of still living species found of both plants and animals fossil in the deposits. (See PALÆOBOTANY.) Some of the distinctive types of invertebrates were of larger size than usual. Sponges and corals are abundant only in restricted localities. Foraminifera, Radiolaria, echinoderms, Bryozoa, lamellibranchs, and gastropods are present in great variety while crinoids, brachiopods and cephalopods are comparative rarities. The preponderance of crabs, with a number of extinct genera, over the long-tailed, lobster-like decapods is very marked. Acorn barnacles, often of large size, are common, and fresh-water snails and mussels, all of modern types, are abundant in the fresh-water deposits of both Europe and America. Insects of all kinds have been found in the Oligocene and Miocene deposits, especially at Florissant and White River, Colo., and in the amber of the Baltic provinces, which latter has furnished about 2,000 species.

But the greatest interest attaches to the vertebrate fauna of the Tertiary, for during the early days of this period the placental mammals outstripped the marsupials and monotremes, and became the lords of the land, and toward the end of the period appeared man. The reptiles, which held so prominent a place during the Mesozoic, are reduced to the true lizards, snakes, crocodiles, and turtles. The amphibia which, as Stegocephalia, had become almost extinct during the middle Mesozoic were resurrected in the Eocene as salamanders, toads, and frogs, and continued thence till the present day. The fishes included numerous large sharks and a preponderance of bony fishes of which many belonged to modern genera, such as perch, herring, carp, pike, catfish, eels, breams, and mackerel. Birds exhibit a continuously expanding evolution during the Tertiary and they are still expanding. See MAMMALIA; TERTIARY PERIOD.

*Conclusion.*—The dominant types of the consecutive periods present on the whole an increasing degree of perfection of structure, and the dominant types of one age are, as a rule, not related to the dominant types of the preceding age. These dominants are usually the most highly specialized members of the classes or orders to which they belong, and it is further to

be noted that dominance and high specialization have in most cases been soon followed by decline and extinction. The small primitive forms of one period may evolve into the large dominant types of the next epoch and in their turn decline and disappear. In the invertebrates and lower vertebrates (fish, amphibia, and reptiles) the rate of this evolution, and consequently the destiny of the race, is almost wholly dependent upon the presence and continuance of favorable conditions of existence, for these types have little or no ability to surmount physical difficulties. Among the higher vertebrates, enlargement of the brain mass and of the mental faculties enables the animals to circumvent unfavorable conditions to some extent, but they also are comparatively helpless. It is in man, with his highly developed intellect, and mechanical skill, that we see the only organism able not only to circumvent unfavorable conditions of life but actually to nullify them, and to practically subjugate all other organisms or render them useful to him in his affairs. We have said that high specialization indicates approaching decline and extinction. That is true in respect of structural evolution, but as regards intellectual evolution, and the directions in which it may differentiate, we know next to nothing beyond the fact that intellectuality has up to the present time evolved with remarkable acceleration. In view of this it seems impossible to conceive otherwise than that man, under strong physical, moral and religious control, can have before him any other than a future longer and more brilliant than his comparatively brief existence.

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**Palæozoic, Paleozoic,** the third great division of Geologic time and the first one in the sediments of which well preserved organic remains have so far been found. It is preceded by the Proterozoic or Eozoic (first life or dawn of life) and by the Azoic (no life) divisions in descending order, and succeeded by the Mesozoic (Mediæval life) the Cenozoic (recent life) and the Psychozoic (mind life) time divisions, in ascending order. The name signifies ancient life and has reference to the character of the plant and animal life of the time, which was markedly unlike that of the present. As a time division, the Palæozoic is generally called an Era, this term meeting with the recommendation of the International Geological Congress at its Bologna convention in 1881. Dana in his 'Manual of Geology' (5th edition) however uses the expression "Palæozoic Æon or Palæozoic Time," and applies it to the next smaller subdivision. In this he has been followed by several authors. Though in its modern sense primarily used for a time division, the term Palæozoic is also applied to that division of the earth's crust which was formed during that time. And indeed this is the original use of the term, when it was coined for the reception of the fossiliferous rocks below the so-called Secondary or Mesozoic formation. The rocks thus named were formerly included with the crystalline rocks of all ages as "Primary," but later on they were separated at least in part, as "Transition rocks." Lyell, to avoid confusion, spoke of them as the "Primary fossiliferous rocks." The following parallel columns express perhaps as nearly as possible the correlation between the older and newer terms.

OLDER	NEWER
Quaternary	Psychozoic
Tertiary	Cenozoic or Cainozoic
Secondary	Mesozoic
Transition (or Primary fossiliferous).	Palæozoic
Primary	{ Eozoic (or Proterozoic) { Azoic

In the formation scale the term "group" was recommended by the International Congress as coordinate in rank with that of Era in the time scale. This recommendation has not been very generally adopted in America, where the term group is commonly used for a smaller formation and "series" used for such rock divisions as that corresponding to the Palæozoic æon.

The following subdivisions of the Palæozoic are recognized:

Permian (or Permian) era and system.  
Carbonic (Carboniferous or Carbonian) era and system.  
Devonian (Devonian) era and system.  
Siluric (Silurian, Upper Silurian) era and system.  
Ordovician (Ordovician, Lower Silurian or Champlainic) era and system.  
Cambrian (Cambrian) era and system.

**Characteristic Life of the Palæozoic.**—The characteristics of Palæozoic life were very marked and stamp the æon as boldly contrasted with the succeeding Mesozoic. The Hydrozoa were represented by the group of Graptolites, and by *Dictyonema*, both of which are wholly confined to the Palæozoic. Among corals the group of rugose corals, or *Tetracoralla* (so-called from having four primary radiating lamellæ or septa with reference to which the others are arranged), the honey-comb corals, *Favosites*, and the tube corals, *Aulopora*, *Syringopora*, *Halysites*, etc., are characteristic types practically unknown in post-Palæozoic time. Among the *Pelmatozoa* or stemmed Echinoderms, the two groups of Cystids and Blastids are wholly confined to the Palæozoic, while the Crinoids with the exception of the family *Articulata*, and the genera *Marsupites* and *Umtacrinus* are likewise restricted to the Palæozoic. *Asterozoa*, or star-fish and brittle stars, and *Echinozoa* or sea-urchins and holothurians, while represented in Palæozoic rocks, especially the Echini, are more characteristically known from Mesozoic and later strata. The *Bryozoa* are well represented by such types as *Ceramopora* and *Fistulipora* and their congeners among the *Cyclostomatous Bryozoa*; by the *Monticuliporoids* and related types constituting the sub-order *Trepotomata* of Ulrich; and by the *Fenestelloids* and related types constituting the sub-order *Cryptotomata* of Vine. These often constructed extensive reefs, and in the Ordovician especially, gave rise to extensive limestone deposits.

Brachiopods are perhaps the most important Palæozoic types, no less than 2,600 species having been described from the Ordovician and Siluric deposits alone. Several archaic families, that is, the *Lingulidæ*, the *Discinidæ* and the *Craniidæ*, and the family of the *Rhynchonellidæ*, range from the Ordovician to the present time while modern types such as some of the *Terebratuloid* families and the family *Thecidiidæ* among the *Strophomenoid* shells begin in the middle or late Palæozoic. By far the largest number, however, end with the Permian or before, while a few others run on into the Trias. The *Spirifer* family, so characteristic of the Palæozoic horizons, is represented in both Triassic and Jurassic beds by a few genera.

Leaving out of consideration the persistent archaic families before mentioned, the post-Palæozoic brachiopods belong chiefly to the *Rhynchonelloid* and *Terebratuloid* families of the most specialized order of Brachiopods, the

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**Telotre mata.** The only prominent exception is the modern family of Thecidiidæ of the Protremata, which makes its appearance in the Carbonic rocks.

Turning to the Pelecypods or bivalve mollusks, we find that their principal representatives belong to post-Palæozoic time. The primitive order of Prionodesmacea, represented by such modern types as the oyster and scallop (*Pecten*), alone has a prominent representation in the Palæozoic, where about thirty families are found. Of these more than one half continued to exist beyond Palæozoic time, with few exceptions indeed down to the present time. Only thirteen out of forty families of this order (as now understood) are confined to the Palæozoic. On the other hand post-Palæozoic time is characterized by about eighty-six families. The gastropoda are likewise essentially post-Palæozoic Mollusca, those of Palæozoic time being essentially primitive or archaic in character. Among the most typical Palæozoic forms are the *Pleurotomariidæ*, *Bellerophonitidæ*, *Euomphalidæ*, *Trochonematidæ* and the *Platyceroids*. The group of the *Conularida* with *Hyalolithes*, *Tentaculites* and *Conularia*, are also typically Palæozoic, only a few representatives of the latter continuing into the Lias.

The tetrabranchiate cephalopods were well represented during the Palæozoic by the *Nautiloidea*. Of forty families belonging to this class, only three originated in post-Palæozoic time, and only one of these, the family of the true *Nautilus*, continued to the present time. Of the thirty-seven Palæozoic families three have representative genera in the Trias and one is represented by a single lower Jurassic genus. The straight-coned nautiloids (*orthoceracones*), the bent cones (*cyrtoceracones*), and the loose-coiled cones (*gyroceracones*) are practically confined to the Palæozoic rocks, the close-coiled nautilicones alone characterizing later horizons as well. The ammonoids on the other hand are represented in Palæozoic rocks only by their more primitive types. The *Goniatitoids* and *Climenoids* belong exclusively to the Palæozoic (Devonic to Permian), while the other groups are only represented by the order *Phyllocampyli*.

Among crustacea, the *Trilobites* are wholly confined to the Palæozoic rocks, of which they constitute in many respects the most characteristic type of fossil. Their greatest development was during Cambrian and Ordovician time. The remarkable order of *Eurypterid crustaceans* is also confined to the Palæozoic, constituting the most characteristic type of certain formations. The only other type of crustaceans abundantly represented in the Palæozoic rocks is that of the small bivalve ostracods.

**Palæogeography of North America.**—The physiographic changes which the North American continent suffered during Palæozoic time may be summarized as follows: In early Cambrian time the greater part of the interior of North America was out of water, the eastern shore being probably a short distance east of the present Appalachians, and the western shore on the western flanks of the rocky mountains. The southern shore was not far north of the present southern boundary of the United States. A narrow gulf extended northward along the western flank of the Appalachian protaxis, and probably connected with a similar gulf extending southward from the present Saint Lawrence gulf.

The fauna of this Appalachian trough was mostly distinct from that of the Atlantic border. In the succeeding periods there was a continuous subsidence of the land, and a transgression of the shore-line, which closed in upon it, especially from the southwest. As the sea in each succeeding epoch reached farther up onto the land than it did before, the deposits of later date lapped over the earlier ones. This encroachment continued with many interruptions through the early part of Ordovician time, when the great Appalachian Valley, bounded by two parallel folds, came into existence. This separated the interior or Mississippian sea from the Atlantic, until, with the final emergence of the land, this sea was transferred to the Great Plains region of the west.

Coincident with the formation of these folds, the interior sea retreated southwestward, only to readvance again during middle Ordovician time, when it reached far up onto the old Canadian land. Though generally distinct from the Atlantic, periodic communications were established across the barriers, allowing the ingress into the eastern area, of the European graptolite and trilobite faunas, in middle Trenton and in Utica time. At the close of Ordovician time, the Taconic revolution caused the formation of an effectual eastern barrier, and at the same time the waters of the interior sea were largely withdrawn. A gradual resubmergence in Silurian times, re-established the Mississippian sea. In mid-Silurian time it was probably entirely enclosed by land, only the region between the Appalachians and the Mississippi River being covered by water. This water body extended northwestward over what is now Hudson Bay and the arctic regions beyond. It probably communicated with the European continent by a channel traversing the north polar regions, the north Atlantic being then replaced by a continuous land area which connected New England with Scandinavia by way of Labrador and Greenland. This northern channel was later on closed for a period, so that all that portion covering the eastern United States became a saline sea in which life became extinct. In this North American dead sea, the great Silurian salt and gypsum beds of New York, Ohio and Michigan were deposited. At the close of the Silurian the whole of the North American continent became dry land, and the Mississippian sea was reduced to a narrow channel along its former eastern border. In this channel the Helderbergian rocks of the New York and the Appalachian region were deposited. Toward mid-Devonian time this sea spread westward again to Michigan and southward to Indiana, and the great Palæozoic coral reefs began to flourish. The westward transgression of the Mississippian sea continued, until finally a northwest channel was established, by which the Eurasian faunas could enter across what is now northwestern Canada. Many fluctuations and adjustments took place, the eastern border of the sea growing shallower, and the western deeper. In early Carbonic time, the sands deposited in the eastern part of this Mediterranean sea permitted the existence of only a sparse fauna, while in the region now known as the Mississippi Valley, great reefs of crinoids flourished. In mid-Carbonic time, the interior sea extended to the foot of the Rocky Mountains, while the greater part of the region east of the present Mississippi

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River was converted into the fresh water morasses, in which the extensive coal beds of eastern North America were deposited. This condition continued with slight changes through Permian time, and was terminated by the great physiographic changes which accompanied the formation of the Appalachian Mountains. This resulted in the permanent elevation of the North American continent. Marine deposits of the early Mesozoic are known only in the northwest. Later in Cretaceous time, the Great Plains region and the Atlantic border were resubmerged, but eastern North America remained continuously above water, with the exception of a slight submergence in the Hudson and Champlain valleys in late Pleistocene time.

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**Palæs'tra** (Greek, "wrestling-school"), originally a school for the training of Greek youth in gymnastic exercises. At first private, such schools were afterward supported by the state, and in the most comprehensive sense a palæstra was a public place set apart, and under official direction, for exercises in wrestling and various forms of athletics. In these schools or gymnasiums special privileges were given to athletes training for contests in the public games. The name palæstra is also applied to wrestling and athletics themselves.

**Palafox y Melzi**, DON JOSÉ DE, dōn hō-sā' dā pā-lā-foh' ē māl'thē, DUKE OF SARAGOSSA, Spanish patriot: b. Aragon 1780; d. Paris, France, 16 Feb. 1847. When very young he was appointed an officer of the royal bodyguard and in that capacity accompanied Ferdinand VII. to Bayonne in 1808. Palafox escaped the capture which befell his royal master and fled to Saragossa which he defended in two sieges in 1808-9, but was captured by the French and imprisoned (1809-13) at Vincennes. He then returned with the king to Spain, and was confirmed as captain of Aragon. Later he turned against Ferdinand VII. and in 1833 joined the forces of Queen Isabella. He was created Duke of Saragossa in 1836.

**Palaihnihan**, pā-līh'nī-hān, or **Pit River Indians**, an American family comprising numerous tribes living in the northeastern part of California, in the basin of the Pit River, hence the local or common name of Pit River Indians. Seven distinct tribes of these people were known in the days of 1849, but they are now almost extinct. They are of a low type of the American aborigines.

**Palais Royal**, Fr. pā-lā rwā-yāl, a collection of buildings in the Rue Richelieu in Paris, composed of a palace, public gardens, shops, cafés, and restaurants. The palace was built in 1634. (See PARIS.) Here Napoleon installed the Tribunal. At the restoration it was repurchased by the Duke of Orleans. He formed the Cours de Nemours, and built the Gallerie d'Orléans. At the revolution of 1848 the Palais Royal was appropriated as the domain of the state, and called the Palais National. On 23 May 1871, during the struggle between the army of Versailles and the Communists it was set on fire. The left wing and part of the central pavilion were destroyed, but the galleries and the Théâtre Français were preserved. The destroyed wing has been rebuilt, and other portions

of the palace have also been restored. The Théâtre Français and the Théâtre du Palais Royal form part of the buildings.

**Palamedes**, pāl-a-mē'dēz, in Greek mythology, a hero, the son of Nauplius and Clymene. Although figuring prominently in the later accounts of the Trojan war, he is not referred to in the Homeric writings. Having discovered that the madness of Odysseus was only feigned, and having brought him to the leaders before Troy, Palamedes is said to have become an object of hate to that hero, and to the vengeance of Odysseus, according to some of the varying stories, the death of Palamedes was due. He is represented as skilled in learning, and his name is connected with the invention of letters, numbers, money, weights and measures, checkers, and dice.

**Palanan**, pā-lā'nān, Philippines, a pueblo of the province of Isabela, Luzon, on a river, five miles from the Pacific coast, at the foot of the Sierra Madre Mountains, 36 miles east of Ilagan. A mountain trail begins at this point, and Palanan is the trade centre for the surrounding region. It was here that Aguinaldo was located and captured. Pop. 1,140.

**Palanpur**, pā-lan-poor', **Pahlanpur**, or **Pahlumpur**, native state of India in the province of Gujarat, Bombay division, south of Rajputana. The state is crossed by the Rajputana-Malwa railway, on which the town of Palanpur, capital of the district, is, a junction for the British cantonment of Deesa. The native state has an area of 3,177 square miles and population of about 222,627. A political agency including this and other surrounding states contains 4,775 square miles and has a population of 467,691. The town, with a population of about 17,799, like the state and the agency, suffered terribly from plague, so that the population is one quarter less than 10 years ago.

**Palanquin**, pāl-an-kēn', **Palankeen**, or **Palki**, a vehicle commonly used in India and Oriental countries. It is a sort of litter or covered carriage, borne on the shoulders of four porters, eight of whom are attached to it, and who relieve each other. It is usually provided with a bed and cushions, and a curtain, which can be dropped when the occupant is disposed to sleep.

**Palate**, the roof and the superior aspect of the mouth or oral cavity toward its hinder or posterior portions. Anatomists are accustomed to speak of the hard and the soft palate. The former is constituted by the palate and superior maxillary bones; the latter is the more or less mobile prolongation of the hinder part of the roof or lining membrane of the mouth which is attached to the posterior border of the hard palate. The hard palate supports the tongue when that organ is employed in tasting, in the production of articulate sounds, in mastication, and in swallowing. The membranes and tissues which cover the bones forming the hard palate are of thick conformation, and are closely bound to the surface of the bones. The tissues are thinner toward the middle line of the palate. The palatine glands exist in a row on each side of the hard palate, and are most numerous and of larger size as the hard palate is continued backward to form the soft palate. The mucous

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membrane of the hard palate is of a whitish color, this appearance being produced by a thick layer of epithelial cells covering the membrane.

The soft palate exists only in the crocodiles out of the class *Mammalia*. In the *Cetacea* it forms a muscular canal, which prolongs the hinder nostrils downward and backward, and is thus adapted to the breathing-process of these aquatic forms. In the ant-eaters the soft palate is nearly eight inches in length. It consists in all of mucous membrane and muscles, and forms a semi-partition between the mouth and the hinder nostrils. In front it is attached to the hard palate. Behind it is free, and in the middle a pointed process, the uvula, is situated. Its upper surface, or that next the nasal passages, is convex, and is prolonged to form the floor of the nose. The lower or under surface is concave, so as to adapt it to receive the back of the tongue; and on this surface the soft palate bears a median ridge, showing the early stage of its formation, when it consists of two halves. Non-union of these halves and of those of the hard palate produce the deformity known as cleft palate. Mucous glands are abundantly distributed in the membrane forming the soft palate, these structures secreting the mucus which serves to lubricate the throat during the passage of food. Above these glands muscular tissue is found, and the upper surface is formed of mucous membrane of the nasal passages already alluded to. The uvula, depending in the middle of the soft palate, gives to the latter the appearance of a divided or double arch. This structure, the uses of which are undetermined, consists of numerous mucous glands, and a muscle known as the *azygos uvulæ*. The uvula varies in length in different subjects and at different times in the same person. Its permanent elongation gives rise to an irritant cough produced by its tickling the throat, and for the relief of this complaint its lower border is frequently excised.

In front the soft palate becomes continuous with the tongue and pharynx or back part of the mouth through two mucous and muscular folds on either side known as the anterior and posterior pillars of the fauces. The anterior arch of each side exists as a curve from the uvula to the side of the tongue. The posterior arch begins at the uvula, follows the free edge of the soft palate, and ends at the side of the pharynx. The pillars of each side separate or diverge in a triangular manner from their point of origin, and within the triangle of each side a tonsil is contained.

The muscles of the soft palate number five pairs. These are the *levator palati*, which raise the soft palate and bring it to the horizontal position in swallowing. The *tensor palati* draw the soft palate downward and tighten it, and their action also includes the keeping patent and open of the Eustachian tube. The *palatoglossi* and *palatopharyngei* muscles form the bulk of the arches of the soft palate; and the *azygos uvulæ* muscle constitutes the last structure of this description included in the soft palate. The tonsils or *amygdalæ* ("almond-like") are placed between the palatine arches. The substance of each tonsil contains numerous follicles, which open externally by 12 or 15 openings, and more deeply placed are masses of adenoid or lymphatic tissue similar to the Peyer's

patches (q.v.) of the intestine. The tonsils are liable to inflammatory affections, and are excised for disease without leaving any bad effects. (See *TONSILLITIS*.) Both the hard and soft palate are supplied with blood by the descending palatine branch of the internal maxillary artery, and with nerves by the palatine branches of the superior maxillary nerve. The use of the soft palate is chiefly to close the posterior nares or nostrils, and so to prevent the escape of the food by the nose in swallowing; during which process the palate is elevated by the levator muscles from its usually dependent position to the horizontal position. In the latter position it lies upon the back of the pharynx, and so closes the nares. The arches of the palate assist in swallowing. The anterior arches during deglutition contract, so as to prevent the food from returning into the mouth; while the posterior arches contract at the sides, and so preclude the escape of food into the nose. The whole process of swallowing is performed firstly by the mass of food being brought to the back of the tongue. The lower jaw being next closed to afford a fixed point for the action of the muscles which raise the larynx, the food is sent into the elevated pharynx by the pressure of the tongue on the palate. The posterior palatine arches and soft palate prevent the escape of the food into the nose at this stage; the anterior palatine arches and tongue prevent it returning to the mouth; the epiglottis is shut over the upper opening of the larynx so as to prevent the food entering the windpipe; and by the action of the constrictor muscles of the pharynx the food is finally shot into the *œsophagus* or gullet, along which tube it is propelled to the stomach by the peristaltic or vermicular contraction of its muscular walls. See *MOUTH*; *NOSE AND THROAT*; *PHARYNX*; *TONGUE*.

**Palatinate, The**, (1) a comprehensive term for two states of the German Empire, which, until 1620, were united. The name Palatinate (German, *Pfalz*) was originally given to the imperial castles dispersed over the German Empire, in which the emperors resided alternately, with a view to maintain order by their presence, and to administer justice impartially in all the provinces of the empire. The palatine or count palatine was the highest civil and judicial officer in these castles. Finally, the title was retained by only two of the territorial magnates of the empire, whose states were distinguished as the Upper and Lower Palatinate, or as the Palatinates of Bavaria and the Rhine. The Upper Palatinate was included in the circle of Bavaria, and was bounded north by the county of Baireuth, east by Bohemia, south by the county of Neuburg, west by Bavaria and the territory of Nuremberg. Its capital was Amberg. The Lower Palatinate (Palatinate of the Rhine) was contained in the electoral circle of the Rhine, and was situated on both sides of the river. It was bounded by the territories of Mainz, Katzenellenbogen, Würtemberg, Baden, Alsace, Lorraine, and Trèves. It was composed of the Palatinate proper or Electoral Palatinate on the right bank of the Rhine, one of the most fertile countries in Europe, and of the Principality of Simmern, the Duchy of Deux-Ponts (Zweibrücken), the half of the county of Spanheim, and the principalities of Veldenz and Lautern. The counts-palatine of the Rhine,



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whose original seat was Aix-la-Chapelle, in the 11th century were already in possession of the office, and of the lands pertaining to it, and were among the most powerful princes of the German Empire. In 1227 the entire Palatinate fell into the possession of the house of Bavaria and underwent a series of successions until 1619 when Frederick V., of the Simmern line, who had succeeded in 1610, was put to the ban of the empire for aspiring to the crown of Bohemia. (See GERMANY; THIRTY YEARS' WAR.) His Electorate and estates were given in 1623 to Maximilian, duke of Bavaria. Charles Louis, son of Frederick V., recovered the Lower Palatinate by the Peace of Westphalia (1648), and a new electorate, the eighth, was created for him, with the office of high-treasurer. The Upper Palatinate and the former rank of the elector-palatine in the electoral college remained with Bavaria. In 1742 the electorate fell to the Sulzbach line, represented by Karl Theodor, and in 1777 he succeeded to the Electorate of Bavaria, a portion of the estates of which, however, fell to Austria. This was accompanied by the recovery of the old electoral office of the Palatinate, and the transference of the grand-treasurership to Brunswick. Toward the close of his reign the Palatinate was conquered by the French. He died without issue in 1799, and was succeeded by Maximilian Joseph, duke of Zweibrücken. At the Peace of Lunéville (1801) he was compelled to surrender the Palatinate. The possessions on the left bank of the Rhine were annexed to France, a considerable part of the remainder was given to the Grand-duke of Baden, and the rest was distributed among other princes. At the Peace of 1814 Germany recovered her possessions on the left bank of the Rhine, and the Palatinate was redistributed among Bavaria, Baden, Hesse-Darmstadt, and Prussia. The portion belonging to Baden is included in the circles of Mannheim, Heidelberg, and Mosbach; the Darmstadt portion constitutes the provinces of Starkenburg and Rheinhessen. Bavaria received the whole of the Upper Palatinate and the portion of the Lower Palatinate, forming the Bavarian circle of Rheinpfalz. The Prussian portion was added to the Prussian province of Rheinland.

(2) The term palatinate or county palatine came into use in England during the 13th century, the counts or earls-palatine ruling over entire counties, acting as independent princes, exacting feudal rights and contributions, and simply swearing homage and fealty to the king. The principal counties palatine were Lancaster, Chester, and Durham. In the colonial days of the United States Maryland was granted to the Baltimore family as a county palatine on the model of Durham.

**Palatine Hill** (Lat. *Palatium*, later *Mons Palatinus*), the most central, the earliest settled, and (save for the Capitoline) the most famous and important of the seven hills of Rome. About 150 feet above the Tiber and 15 more above the sea-level the hill is an irregular quadrilateral, and to this shape is due the mythical *Roma quadrata*, the primitive city built by Romulus. The name *Palatium*, which the Romans connected with the Arcadian city *Palantium*, is probably related with *Pales*, an Italian rural divinity. On the Palatine the Lupercales was celebrated in honor of Romulus;

there were the ancient temples (of Victory, Jupiter Stator, and the Magna Mater) in the days of the early republic, the residences of Cicero, Marcus Scaurus, and others in the last period of the republic, and at the beginning of the principate Augustus' own home (to which fact the use of the word "palace" from *Palatium* is due), the temple of Apollo dedicated in 28 B.C., and the Latin and Greek library. Tiberius and Caligula built additions to Augustus' palace; the latter emperor bridged the Capitoline to the Palatine. The Palatine was no longer used as an imperial residence after the time of Alexander Severus, and there was no more splendid building there until Pope Paul III. built the villa called Orti Farnesiani. Excavations of the hill began in 1762 under Bianchi's superintendence, and was renewed a century later by Rosa at the expense of Napoleon III. The Italian government purchased the Farnese Gardens in 1871, and now has charge of excavations.

**Palatka**, pa-lăt'ka, Florida, city, county-seat of Putnam County; on the St. John's River; and on the Florida E. C., the Florida Southern, the Georgia S. & F., and the Jacksonville. F. & K. W. R.R.'s; 47 miles in direct line south of Jacksonville. It is the centre of a prosperous agricultural and fruit region, is in daily steamer communication with Jacksonville, and exports large quantities of oranges, sugar, and cotton. It is also popular as a winter resort. It is the seat of the Putnam County High School, and of the St. Joseph's Academy and Day School (R. C.). Pop. (1890) 3,039; (1900) 3,301; (1910) 3,779.

**Palawan**, pā-lā'wān, Philippines, the most southwestern island of the archipelago, lying west of Mindoro, Panay, and Negros; it is bounded on the west by the China Sea, which it separates from the Sulu or Mindoro seas; area 4,368 square miles, with dependent islands 4,726 square miles. It is one of the largest islands of the Philippines, and from its geographical position one of the most important, as it lies in the trade route between India and China and Manila.

**Topography and Climate.**—The island is long and narrow in shape; the greatest length from northeast to southwest is 278 miles, and the width averages only 17 miles, and is nowhere more than 30 miles. The coast is indented with numerous sounds, gulfs, and bays, most important among them Malampaya Sound (q.v.). A mountain system which divides Palawan into two watersheds, extends the length of the island following the general direction of the coast; the highest summit of this system is Manta-ligahan in the south (6,843 feet); the average height is from 2,500 to 3,000 feet; between the summits are high table-lands. There are a number of rivers, which are all short; in the northern part there is a lake which opens into the ocean by a subterranean river. The climatology of the island shows two seasons, the southwest monsoon or wet season and the northeast monsoon or dry season; the heat is not extreme; malarial fevers are common on some parts of the coast.

**Forests and Fauna.**—The mountains are very heavily wooded, the forests contain valuable building, dye, and medicinal woods, including ebony, sandal, logwood, bamboo, ipil (a very hard wood), apiay, camphor, gum mastic, mo-

## PALAWAN PASSAGE — PALEMBANG

lave; a number of the trees found in Palawan exist nowhere else in the Philippines. Dammar, a gum which exudes from a large tree, is found in many places in deposits in the earth, which have, however, never been fully worked. The nipa palm grows luxuriantly along the rivers, and rattan is an important article of export. There are also numerous plants of varied character, including orchids and pitcher plants; among the latter is a trailing variety, the pitchers of which will hold a pint and a half of water.

The wild animals of Palawan are not very numerous; there are several varieties of the monkeys, also the pakdá or big ape, and porcupines; the birds are mostly of unusual species. Reptiles are abundant; alligators are commonly found in the lakes and swamps, and the pythons are unusually large, specimens over 22 feet long having been found.

**Industrial Resources.**—The resources of the island are as yet poorly developed. The chief industry is the raising of cattle, hogs, and goats; goats and fowls are bartered with the ships along the coast. Rice, tobacco, nutmegs, sweet potatoes, and other food products are raised for home consumption, and there are a few primitive manufactures also for domestic use. Edible birds' nests are found in large numbers in the rocky caverns of the coasts; they are of excellent quality, being considered second only to those of Peñon de Coron (q.v.), and have brought twice their weight in silver in the Chinese market. Honey and wax are also collected and brought to the coast for trade. There are no roads, except a few portages, but a number of trails; the rivers also afford means of transportation near the coast.

**People and History.**—The dominating race of the northern and central parts of the island are the Tagbanúas (q.v.), a peaceful and docile race; the Moros predominate in the southern part, south of the 10th parallel of latitude. Previous to the 18th century Palawan was a part of the sultanate of Borneo; in the early part of that century the Spaniards established several garrisons in the northern part of the island for the purpose of protecting their dominions on the north from the Moro pirates, and the island was soon afterward ceded to Spain. In 1885 a special attempt was made by the Spanish government to colonize Palawan by offering settlers free transportation and other privileges, but this failed. An attempt to establish a convict settlement was also unsuccessful, and Spanish authority was recognized only along the coast. The United States troops occupied Palawan in the early part of 1902, and in June of that year civil government was established in that part of the island lying north of the 10th parallel of latitude; the part south of this parallel, known as the Country of the Moros, is as yet (1904) without civil government. The most important town of Moro Palawan is Puerto Princesa, which has not 2,000 inhabitants. The island of Balábac, lying south of Palawan, is governed in accordance with the terms of the treaty with the Sultan of Sulu. Population of the island 50,000.

**Palawan Passage**, the route through the Balábac Strait and along the east coast of Palawan, used by vessels in the trade between China and Manila during the latter part of the southwest monsoons, because more sheltered

than the China Sea route to the west of Palawan. This route was first explored in 1850 by Captain Bates of the British navy, and soon afterward generally adopted.

**Palay'**, an Indian climbing plant (*Cryptostegia grandiflora*) of the milkweed family. Its stalk-fibres, which are strong and white, are spun into a very fine yarn; and its milky juice forms a kind of caoutchouc.

**Palazzo Pitti**, pā-lāt'sō pīt'tē, a palace in Florence. See FLORENCE.

**Pale, The**, or the **English Pale**, Ireland, a name applied in the 16th century to that part of Ireland which was completely under English rule, to distinguish it from the parts where the old Irish laws and customs prevailed. It varied in extent at different periods, consisting of Dublin and more or less of the neighboring country.

**Pa'lea**, plural **Paleæ**, the bracts, usually membranous and colorless, on the receptacle of a composite plant between the florets; the chaff. Also the bracts immediately surrounding the fertilizing organs in grasses. See BRACTS; FLOWER.

**Paleario**, pā-lā-ā-rē-ō, **Antonio**, more correctly, ANTONIO DEI PAGLIARICI, and according to his Latinized title AONIUS PALEARIUS, Italian religious innovator: b. Veroli, Roman Campagna, 1500; d. Rome 1570. He was a teacher of rhetoric, whose reputation had spread over all Italy and abroad, and made his home especially at Sienna, but in 1567 was brought before the Holy Inquisition at Rome and three years later suffered at the stake. His principal work is a long Latin didactic poem, 'De Immortalitate Animarum.' Famous as his poetic and theological writings were, equally popular was the work attributed to him, 'Del Beneficio de Giesú Christo Crocifisso' (1543), which was translated into several languages, but in 1549 was suppressed by the Inquisition. It was published at Cambridge, England (1853), and at Leipsic with a German translation by Tischendorf (1856). Ranke maintained it to be the work of a Benedictine monk, Benedetto di Mantua. Consult: Young, 'Life and Times of Antonio Paleario' (1860); Bonnet, 'Aonio Palerio' (1863).

**Palembang**, pā-lēm-bāng', Sumatra, Dutch residency in the southeastern part of the island; also the capital city of the residency. The country is drained by the Musi (or Moesi) River, along the banks of which there are valuable supplies of petroleum. An alluvial plain and plentifully watered, it is very fertile. Its native inhabitants are Moslem Malays, except a race called Orang-Kubu, living by the chase in the thickest jungles and exhibiting a very primitive culture. Palembang residency has an area of 53,497 square miles and a population of about 700,000, of whom 373 are Europeans, 1,876 Arabs and 6,451 Chinese.

Its capital city of the same name lies on both banks of the Musi, 44 miles from its mouth in a swampy region, the houses being sometimes built in the very stream. The old Javanese name for the city seems to have been Malayo, so that it may be the Malajour of Marco Polo and the Mo-lou-yu of the Chinese geographers. An attempt has been made to prove that the town was once held by Hindus, an occupation

## PALENQUE—PALERMO

like that in Java. The main building is an 18th century mosque. Coffee and pepper are exported; and there is some trade in silks, carvings, and goldsmiths' wares. The Dutch built a factory here in 1618, but the country remained independent until 1812 when it was occupied by the English, from whom it passed to the Dutch in 1821. Pop. about 55,000.

**Palenque**, Mexico, ruined city in the state of Chiapas, on the Chacamas River, about 60 miles northeast of Ciudad Real, discovered in 1746. The tropical vegetation of the district makes it impossible to know the exact extent of these ruins. Those which have been visited show great artificial terraces or truncated pyramids, forming the level resting place for temples or palaces of calcareous stone, covered with stuccoed decorations, colored carvings in relief and undeciphered hieroglyphics. These buildings have a slightly sloping, mansard-like roof. Five of the edifices have been styled temples, though it can not be considered at all certain what their use was. They, like the largest of the buildings, which is called the Palace, are divided into two vaulted rooms, there being only the two in each "temple," where, however, the rear chamber is divided into several smaller rooms, whereas in the "Palace" there are many series of these paired rooms. The vaults of the rooms are corbeled and have a triangular arch, commonly but loosely called Mayan, as if to connect the unknown builders with the people of the Mayan empire. The external architecture is too elaborate for brief description and everywhere is covered with stucco figures in alto relievo and brilliant colors, black, blue, reds, yellow, green and white. An arched bridge 30 feet wide and 40 long and an arched waterway 10 feet high, 500 feet long and 7 feet wide have also been found and are typical of the massive architecture of "temples" and "Palace"; some of the walls of the latter are 2 and 3 feet thick. Some valuable remains of early implements and personal decorations have been found in graves on the site. But they throw no light on the question as to the identity of the builders, who have been thought by some to be the semi-mythical Toltecs or the Olmecs. Consult: Holmes, *Ancient Cities of Mexico* (1895); Charnay, *Ancient Cities of the New World* (1887); and Morgan, *Houses and House Life of the American Aborigines* (1881).

**Palermo**, pā-lër'mō, Italy, (1) a seaport town, capital of Sicily, beautifully situated on the northern shore of the island on the Gulf of Palermo, surrounded by a fertile plain and partly enclosed by lofty hills. Its numerous spires, domes, and towers give it a very imposing appearance when approached from the sea. Two main streets, the Via Vittorio Emmanuele and Via Macqueda, intersect the city at right angles to each other. Near the centre is an octagonal space, the Quattro Canti, lined with elegant buildings in different styles of Grecian architecture and adorned with numerous statues. The two principal streets are opened into by a great number of others, mostly narrower and of an inferior description; but all well paved with blocks of lava. There is now an extensive system of electric tramways. Admirable places of resort are provided by the Marina and the Flora—the former a superb terrace about 80 yards wide, stretching about a mile along the

bay; the latter, commencing in the east where the terrace terminates in a magnificent public garden regularly and beautifully laid out, and adorned with statues, fountains, and rustic temples. Here is also a botanic garden of some extent, and there are several other public gardens. The public edifices are numerous, but do not in general display much taste. The most important are the cathedral, the church of San Giuseppe, the church of San Salvatore, La Martorana, and other churches; the royal palace, finely situated and surrounded by beautiful gardens, a large and irregular pile of buildings, among which the only great attractions are the chapel of King Roger (or Palatine Chapel), rich in mosaics, "perhaps the most beautiful palace-chapel in the world," and the observatory; the archiepiscopal palace; the national museum and picture-gallery; the communal library, with about 220,000 volumes; the national library, with over 150,000 volumes; the university, attended by 1,200 students; the barracks, arsenal, courts of justice, theatres, hospitals, and several literary and charitable endowments. Palermo has a good roadstead and harbor, which has been recently improved, and a well-equipped shipbuilding yard and dry dock have been constructed. The principal articles of export are sumach, wines, oranges and lemons, sulphur, tartar, olive-oil, citrate of limes, tomatoes, tomato paste, asphalt, hides, dried vegetables, macaroni, etc.; and among the imports are coal, grain, wood, petroleum, tobacco, iron, and steel rails, sheets, bars, etc., cement, machinery, sulphates, fish, etc. The total number of vessels that cleared from the port in 1900 was 3,732, with a tonnage of 1,677,234. The manufactures of the town include gloves, marble works, etc., and there is a foundry. The fisheries on the coast are productive, and give employment to numerous hands. Palermo is the see of an archbishop, and the seat of a supreme court with jurisdiction over the whole island; of a criminal court for the province, of a commercial and several other inferior courts, and of several important public offices. Its foundation is attributed to the Phœnicians. From them it passed to the Carthaginians, who made it the capital of their Sicilian possessions and the centre of an extended commerce. The Romans obtained possession of it in 254 B.C., made it a free town, and conferred upon it many important privileges, in consequence of which it increased rapidly and became very prosperous. After the fall of the Roman Empire the Saracens became its masters, and kept possession of it till 1072, when it was taken by Roger the Norman, who founded the kingdom of Sicily. Since then it has always continued to be the capital. It has repeatedly suffered from earthquakes. This and the other vicissitudes which it has undergone is probably the reason why so few remains of antiquity are to be found within it. Some, however, still exist in its environs, which, both on this account and their own intrinsic beauty, are in many respects more attractive than the town. During an insurrection which took place in January 1848, the town was bombarded; and Garibaldi seized it in 1860. Pop. about 325,000. (2) The province has an area of 1,948 square miles. Its coast consists of a series of extensive bays and bold promontories. Its interior toward the south is traversed, east

## PALES—PALESTINE

to west, by a branch of the Neptunian Mountains. The streams are numerous, but small. The soil is fertile. Pop. about 800,000.

**Palæa**, *pāl'ēz*, in ancient Italy, a divinity who presided over fields and meadows, and was worshipped, sometimes as a god, sometimes as a goddess, in which latter character Palæa was identified with Vesta or Anna Perenna. The festival of Palilia was celebrated 21 April, the anniversary of the founding of Rome, when milk and cakes of millet were offered. Cognate with Palæa are "palatium," a palace, and "Palatinus," one of the seven hills of Rome, and this divinity, as protector of property, and home, is among the earliest figures that occur in Roman mythology.

**Pal'istine**, also called **The Holy Land**, **Canaan**, **Judea**, and **The Land of Israel**, a classic region of Asiatic Turkey, southwest of Syria, corresponding approximately with the modern mutessarifats of Lebanon and Jerusalem. Its western shore forms the eastward boundary of the Mediterranean Sea and its north, east, and south boundaries respectively, are the Mountains of Lebanon, the Arabian Desert, and Arabia Petrea. It is situated between lat. 31° 30' and 33° 30' N.; lon. 34° 30' to 36° E.; has a length north to south of about 140 miles, a breadth of about 80 miles, and an area of about 10,000 square miles.

**Topography and Physical Features.**—The surface generally is mountainous, traversed by branches from the chain of Lebanon, one of which stretches south in a direction nearly parallel to the coast of the Mediterranean, forming the watershed between its basin and that of the Dead Sea; while another, turning more to the east, stretches along the left side of the valley of the Jordan. The mountains attain their greatest height, of about 9,100 feet, in Mount Hermon, where they first become detached from the principal chain. None of the other heights exceed 4,000 feet; but many are celebrated from the frequent mention made of them in the Bible, and from the events of which they have been the theatre. The most remarkable are Carmel, forming a promontory in the Mediterranean, on the southwest side of the Bay of Acre; Tabor, or the modern Jebel Tur, at the northeast extremity of the plain of Esdraelon; Ebal and Gerizim, in the valley of Samaria; Gilead and Nebo, or Pisgah, on the east side of the Jordan; and Zion, Moriah, and the Mount of Olives, in and near Jerusalem.

Of limestone formation, the mountains abound in caves of all varieties of size and form, many of them of Scriptural importance. The earliest mention of a cave in Scripture is in the history of Lot (Gen. xix. 30). The next is at the death of Sarah, when Abraham bought the cave Machpelah for a burying-place. This is now contained within the limits of a mosque, at Hebron, and remains in all probability just as it was when the patriarchs were buried in it. The Moslems can give no real information regarding it, for they will not enter it, dreading immediate death at the hand of Abraham's spirit, which they believe to reside in it. Caves are frequently mentioned in the books of Judges, Joshua, and Samuel, but the only one specified is that of Adullam, which has been identified with the cave of Khureitūn (the ancient

Hareth), some five miles south of Bethlehem—a singular cave, or rather series of caves and chambers, extending for miles, to which the one entrance is an orifice not larger than a door, half-way down the almost perpendicular face of a precipice; this orifice is reached by a shelf or ledge of rock, along which one has to find the way cautiously to the cave. The interior is quite a labyrinth, with vaulted chambers remarkably dry and warm, but with no impure air. It could accommodate hundreds of men, all hidden in these far-extending chambers. There are caves at Deir-Dubban, not far from Khureitūn, about half-way between Jerusalem and Eleutheropolis, but these do not correspond with the scenes in David's history; although these western ones are reputed to be David's cave, and the eastern (Khureitūn), near Tekoa, Saul's caves or cave. That these huge caves or grottoes at Deir-Dubban were used both for hiding-places and dwelling-places, both in Jewish and Christian days, is pretty evident; but whether this is the place of the Adullam cave of David is not so plain. There were caves in Galilee also. The "cotton cave," or "Kotton-Megharah," under Jerusalem, is a wonderful cavity, extending under a large portion of the city. But though called a "Megharah," it is an old quarry, out of which Jerusalem was partly built, and therefore interesting, especially as the traces of the quarrymen are still visible in every recess.

Palestine has comparatively few plains, but has numerous valleys; it is the country which Moses describes, "a land of hills and valleys." The small plains are numerous, the large few; among them are the maritime plains of Phœnicia and Philistia, the river plain of Jordan, the inland plain of Esdraelon, and the mountain plain of the Bekā, between the two Lebanons. These are widely different from each other, though within a small territory. The sea plains from Gaza to Beirūt are well peopled and tilled. The Jordan plain is nearly a waste of sand, that river making no further impression upon the levels on each side than merely to fringe itself for some 20 yards with verdure. The Esdraelon plain, or "valley of Jezreel," is a fine plain of considerable extent, fertile and well cultivated. In the district of El Huleh or "the Waters of Merom," and in such low-lying districts as Merj-Sanur, between Samaria and Jenin, are marshes and at certain seasons wide tracts rendered almost impassable by the overflow of streams. The heat during the greater part of the year, from April to November, dries up most of the marshes, and scorches both hill and plain. In later ages this is more especially true, as formerly the extensive woods, orchards, vineyards, and olive-yards which clothed the country shut out the heat, cooled the soil, and retained the moisture.

**Hydrography.**—In Palestine from time immemorial, wells and springs have been held in such veneration, that it is as much sacrilege to destroy a well as to defile a mosque or injure a tomb. The places named from the Ensprīng (or fountain) and the Beer (well), are very numerous. Among these are "the Fountain of Two Calves," En-Eglaim, near the Dead Sea; the "Fountain of Gardens," En-gannim, of which name there were two cities, one in Judah and another in Issachar; the "Fountain of the Goat,"

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Engedi, now Ain Jiddi, on the shore of the Dead Sea, one of Judah's rocky springs; the "Fountain of Sharpness," or Swiftmess, En-Haddah, one of the springs of Issachar's plains; En-Rimmon, in the southern extremity of the land; the "Fountain of the Fuller," En-Rogel, the spring of Jerusalem, known in early ages; etc. Besides these there were many other fountains all over the land. There was Hagar's "Fountain" or "Well," Beer-la-hai-roi, in the southern desert, near Beersheba; the "Fountain in Jezreel," by which Israel pitched in the battle between them and the Philistines; and others. There are the "wells" of the patriarchs in different places—the Well of Abraham at Beersheba, now represented by two, still well filled and surrounded by large stone troughs; the wells of Isaac, south of Gerar, Sitnah, Esek, and Rehoboth, of which only the last can be said to have a representative, at Ruhaiben on the great Roman road; the Well of Jacob, dug out of a spur of Gerizim, and close by Joseph's tomb; the Well of Bethlehem, which David knew so well, as no doubt the well of his shepherd-boyhood; the Well of Sirah near Hebron, where Abner was overthrown by Joab's messengers. There are a good many modern wells in use, which, though probably the remains of ancient ones, are unmentioned in Scripture. Few of these wells are properly kept, though none are gratuitously destroyed. Some have become quite unserviceable; and even Jacob's Well is in such a state of disrepair (the masonry in the upper part having fallen in) as to require almost a redigging before it can be of use. Elisha's Fountain still pours out its clear current, though little care is apparently bestowed on it.

There is but one river worthy of the name in Palestine—the Jordan, one of the most tortuous of streams; always supplied with water, though often so considerably beneath the verge of its banks as to be invisible from any distance. The Jordan originates in streams that come from Lebanon and Hermon, and unite in the Waters of Merom. It falls into the Dead Sea after a course of about 70 miles direct, or 200 including windings. Numerous streams find their way westward to the Mediterranean from Libanus and its prolongations or offshoots as far as the Hills of Judah. Equally numerous streams flow eastward from the same range into the Huleh, Sea of Galilee, Dead Sea, and Jordan. Antilibanus, sending its offshoots down the east of Jordan, and forming the Mountains of Golan, Gilead, Ammon, and Moab, is the watershed for a large tract of country between itself and the Ghor or Jordan Valley. Though the rivers are in general small, yet they are not mere summer brooks as many suppose. That but few of the innumerable wadys or water-courses are filled throughout the year is true; but still there are several permanent streams which do good service in the districts through which they pass. Passing by what we may call "Lebanon streams," which are always vigorous, there is the Zerka, a few miles north of Cæsarea; the Aujeh, a little north of Jaffa; and the Rubin, a little south of this last town; and the Mukutta or Kishon (Kutta-Kishon), which is sometimes, however, low enough, so low that when it reaches the sea it is lost in the sands. None of these are navigable, but they are rivers all the year round, and wide enough to allow

boats to ply on them for some little distance. There is a vast number of water-courses in every part of the land, which would make its irrigation minute and complete were the rain sufficient to fill these, or rather sufficiently regulated and distributed over the year to keep these always filled; and were the land properly covered and its soil protected by wood, so as to moderate the heat and prevent the excessive evaporation. The words of Moses were true words when he called it "a good land, a land of brooks of water, of fountains and depths that spring out of valleys and hills." The whole land bears marks of having been better watered than at present, and contains everywhere the remains of artificial appliances, such as terraces, cisterns, and wells, by which the rain was regulated and distributed.

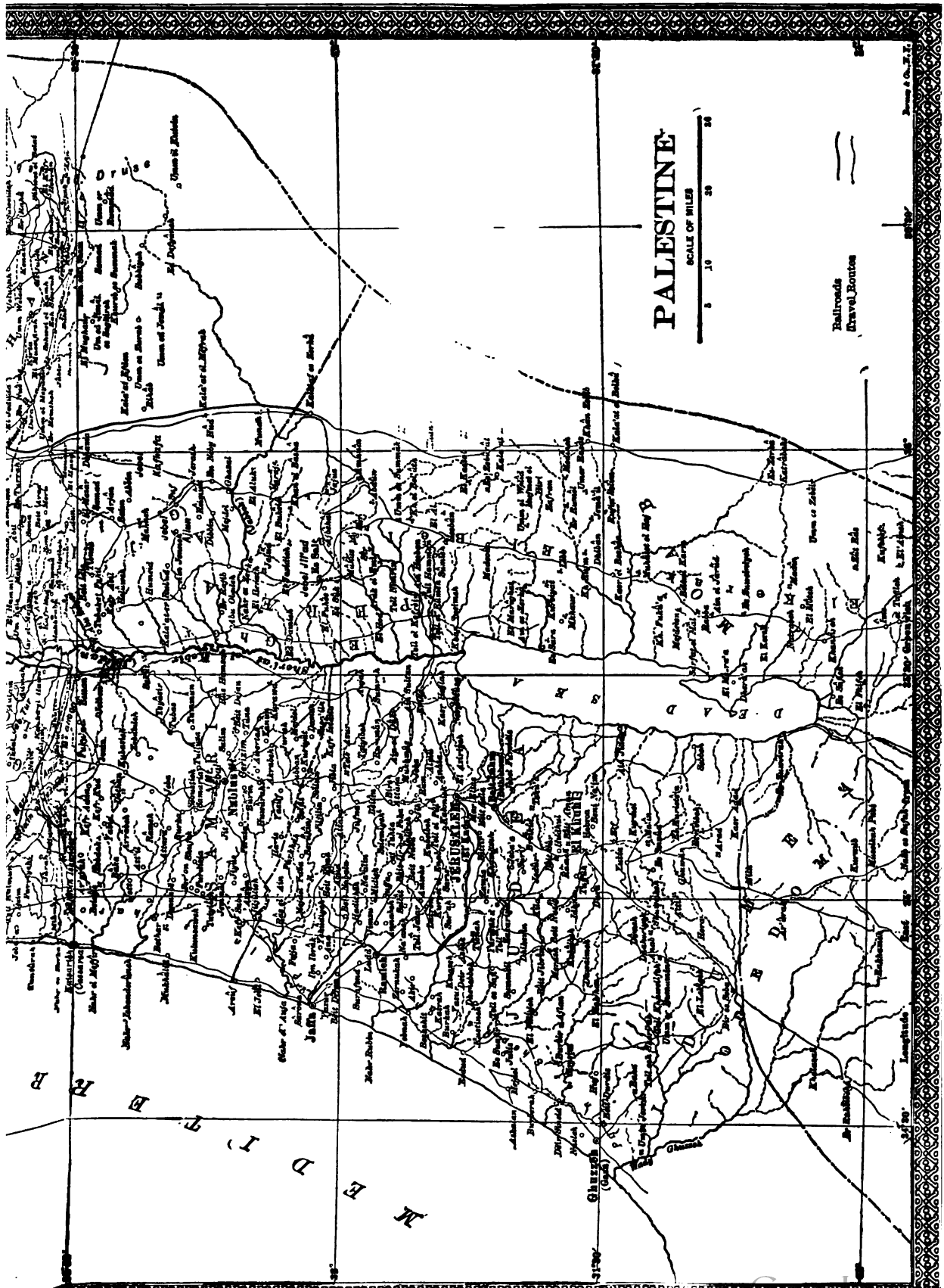
The lakes of Palestine are three in number, Merom, Tiberias, and the Dead Sea, the first seven feet above, the last 1,250 below sea-level. For quiet beauty the Huleh, or "Waters of Merom," with the adjoining vale, are remarkable, and for subdued attractiveness the Sea of Tiberias; but for brilliance there is nothing to be compared to the Dead Sea—the ancient Asphaltis. Whatever of tameness there may be about the former two, about this last all is grandeur, notwithstanding the aridity of its shores, and the discomforts of its exceptionally hot climate. The silvery sparkle of its waters arising from their saline and bituminous composition gives a brightness to the scene which is enhanced, not neutralized, by the dark shadows of the Mountains of Moab. These lakes form three singular depressions or troughs in the great natural groove or gorge extending from the Bekâ to the Arabah, about 200 miles. This extraordinary hollow, so far below sea-level, is kept in its present state mainly by its own heat. Were the climate to become temperate, the Sea of Tiberias would rise greatly, and transform the Jordan into a Rhine, in parts of the Ghor into a lake; the Dead Sea would swell up and overflow into the Arabah, producing changes in the whole of the southern region which it is impossible to calculate upon. The length of the Dead Sea is 45 miles; its greatest breadth 12. The density of its waters varies between 1,160 and 1,230 (pure water being 1,000). There are ancient shore-lines at a height of 1,200 feet on the surrounding hills.

*Geology.*—From the southern border of Palestine, where the hill-country of Judah begins, to the extreme north, there is almost unvarying limestone. In passing from Sardinia, Italy, Greece, or Asia Minor, there is an interesting resemblance, in color, feature, and composition, between the rocks of these regions and those of Syria. Syria is, as a whole, a rugged, hilly region composed of limestone of the Secondary period; a country seamed and torn by volcanic action from one end to another; long stripes of depression and ridges of upheaval running parallel; the latter broken across and across into wide districts of table-land interspersed with hollows and valleys, with solitary hills or little groups of clustering peaks. The great masses of rock which constitute the mountains of Palestine and Lebanon are Jura limestone; compact, hard, not rich in fossils, and full of caverns and grottoes. This rock is everywhere the basis on which have been deposited in some parts extensive tracts of volcanic products; as also chalk









# PALESTINE

SCALE OF MILES  
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Railroads  
Travel Routes



## PALESTINE

and chalky limestone. magnesian limestone (dolomite), sandstone, conglomerate, marl, etc. On the west of the Jordan and Arabah the chalk formation which prevails through the southern desert terminates with the desert; and the Jura limestone, beginning with the mountains south of Hebron, holds its course northward, forming the mass of the western hill-country of Carmel and of Lebanon. East of the Jordan and Arabah, where, around Petra, large masses of porphyry, sandstone, and limestone lie in close proximity, the same Jura limestone extends northward through the Belkah and the mountains of Ajlûn; and is likewise the basis on which rest the vast volcanic tracts of Haurân, Jaulân, and Lejah.

*Flora and Fauna.*—The flora of Palestine is large and varied; about 1,000 species have been noticed, and the whole number is probably at least 2,000. Among the trees are the cedar, oak, ash, olive, palm, sycamore, oleander, walnut, etc. Wheat, barley, and other grains are cultivated; the vine is almost neglected now, though there is no country better suited to its cultivation than Palestine.

The number of mammals inhabiting Palestine is large for the extent of the country, amounting to about eighty in number. Of the wild animals mentioned in the Bible, the lion and the *rcém* or unicorn, that is, the aurochs, are no longer found in Palestine. Among carnivorous animals are the wolf, the hyæna, the jackal; the leopard, on the sides of Carmel and Gilead or in the forests of Galilee; and the bear, in Hermon and Lebanon. The wild boar is common, and much dreaded by the husbandmen on account of the ravages it commits. Other Mammalia are the wild goat, the gazelle, the coney, hare, jerboa, rat, mouse, bat, etc. Of the birds of Palestine there are over 350 species; chief among them are the roller, bee-eater, hoopoe, Smyrna kingfisher, belted kingfisher, sun-bird, great shrike, and bulbul. More noticeable than these brightly-clothed birds is the immense number and variety of the larger birds of prey—the vultures, eagles, falcons, griffons, kites, peregrines, and buzzards, which abound in every part of the Holy Land, and are at first sight its ornithological characteristic. Reptiles are numerous. They include the land and the water tortoise, the crocodile (leviathan), the chameleon, and a variety of lizards and serpents. Fishes are abundant in the Jordan and its affluents, and in the Sea of Galilee are found in immense shoals. The most numerous species are the barbel and the bream. Lower in the scale of animals are the scorpion, the locust, hornet, bee, and grasshopper.

*History.*—The name Palestine, derived from the Hebrew *Peleseth*, and meaning the land of the Philistines, occurs in this sense in several passages of the authorized version of the Bible, and in several others in the Hebrew, where it is translated *Philistia*. It is properly applicable only to the southwest part of the country, stretching along the shores of the Mediterranean. It appears to have been first used in its more extended sense by Greek authors, and derived additional currency from its adoption by Josephus and Philo. The ancient name of the country was Canaan, which it evidently owed to the descent of its inhabitants from Canaan, the

fourth son of Ham, and a grandson of Noah. When thus named, in the time of the patriarchs, it was parceled out among a number of independent tribes or nations; the Kenites, Kenizzites, and Kadmonites, on the east of the Jordan; the Hittites, Perizzites, Jebusites, and Amorites, in the hill-country of the south; the Canaanites proper, in the centre, from the Jordan to the coast; the Girgashites, on the east shore of the Lake of Tiberias; the Hivites, in the north, among the ramifications of Lebanon; the Philistines on the south, and the Phœnicians on the north coast. In the time of Moses the country east of the Jordan was conquered and divided among the tribes of Reuben and Gad and the half tribe of Manasseh. Under Joshua the work of conquest was carried on to the west of the Jordan; and the whole territory, though not to the extent originally promised, allotted to the remaining half tribe of Manasseh and the other ten tribes (1445 B.C.); the larger portion of the south falling to the tribes of Judah and Benjamin. Under Solomon the work of conquest appears to have been completed, and all the land which was originally promised was included within the limits of his kingdom. Under his son Rehoboam the kingdom was rent in twain, and subdivided into the separate kingdoms of Judah in the south, and Israel in the north (975 B.C.). The latter kingdom was often designated by the name of Samaria, its capital. The division of the country into tribes was completely broken up by the Captivity, which carried away ten of them to Assyria, and supplied their place by a new colony; and by the subsequent transportation of the remaining tribes of Judah and Benjamin to Babylon (584 B.C.). After the destruction of the Babylonian empire Palestine fell under the dominion first of the Persians and then of the Macedonians. When Palestine became the cradle of Christianity with the birth of Jesus Christ, the Romans had established their ascendancy, and divided the region into the four provinces of Galilee in the north, Samaria in the centre, Judea in the south, and Perea, which included all the country east of the Jordan. Under Constantine Palestine, now regarded as the Holy Land, acquired new interest, and recovered in some degree from the calamities by which it had been laid desolate; and in 396 A.D., on the division of the empire by Theodosius, and the formation of two empires, a Western and an Eastern, Palestine became a province of the latter. This was its condition at the time when Islamism began to make its conquests. Palestine, unable to offer any resistance, soon fell a prey; and Omar, in 636, after taking possession of its capital, converted it into one of the provinces of his caliphate. The severities exercised toward the Christians having roused the indignation of Europe, gave rise to the Crusades, and Jerusalem became for a time the capital of a Christian kingdom. Ultimately, however, Mohammedanism prevailed, and Palestine sunk into a degraded state; from which it is only now recovering. It is only within the latter half of the 19th century that the exploration of Palestine was first carried out systematically. The most valuable results have been those achieved under the direction of the "Palestine Exploration Fund," a society organized in 1865 for the purpose of making an exhaustive exploration and an exact survey of the Holy Land. The trian-

## PALESTINE — PALESTRINA

gulation of Western Palestine was begun in 1871 and finished in 1877. A large and detailed map of the country has been published and an immense mass of valuable information regarding topography, natural history, its interesting ruins, archaeological remains, and holy places, etc., accumulated. A German society for the exploration of Palestine has existed since 1877. The present population of the country is estimated at 650,000, the Arab element being the prevailing one, and the Arabic language generally in use. The people consist partly of the fellahin or settled cultivators, artisans, etc., partly of the nomad Bedouin, who live by rearing cattle or by less reputable means. The country exports some grain, olive-oil, oranges, etc. Jaffa, Haifa, and Acre are the chief ports, Jerusalem and Nablus the largest towns. Chapels and monasteries belonging to Greek Orthodox, Roman Catholic, and various Protestant churches, abound throughout the land, and especially on and near the sites where the principal events connected with New Testament history were enacted. A railway has been constructed from Jaffa to Jerusalem and other railways in different parts are projected or in progress. Since 1850 colonies of Jews and also of Germans have been established in the country and are engaged successfully in viticulture and wine-making, notwithstanding the opposition and oppressive taxation to which they have been exposed. A feature of interest is the great amount of property acquired by the Sultan since 1885 in the Jordan Valley and other places, and administered on progressive agricultural principles. The following paragraph from a consular report of 1901, summarizes present economic conditions: "There can be no doubt that the establishment of the Jewish colonies in Palestine . . . has brought about a great change in the aspect of the country, and an example has been set before the native rural population of the manner in which agricultural operations are conducted on modern and scientific principles."

See BETHLEHEM; CRUSADES; JERUSALEM; JEWS; NAZARETH; other localities mentioned; and for *Bibliography*, PALESTINE EXPLORATION FUND.

**Palestine**, Texas, city, county-seat of Anderson County; on the International & Great Northern railroad; about 135 miles north of Houston. It was settled in 1846, and in 1870, under a State law, was incorporated. It is in an agricultural region in which cotton is one of the principal products. In the vicinity are salt mines and deposits of iron ore. The chief manufactures are cotton products, iron products, and packed-beef. There is considerable trade in grain, cotton, fruit, and vegetables. The prominent buildings are the railroad offices and shops, the Y. M. C. A. building, the churches and schools. A point of interest is Fort Houston. The government is vested in a mayor who holds office two years, and in a council composed of the mayor and aldermen. Pop. (1890) 5,838; (1900) 8,297; (1910) 10,482.

**Palestine Exploration Fund**, The, an organization founded in London 22 June 1865, for the purpose of investigating and studying the archaeological and other remains of the Holy Land. Excavations were commenced in 1866 and the work has been carried on almost con-

tinuously since. Since 1869 the Society has issued a 'Quarterly Statement,' and maintains a Palestinian Museum at 38 Conduit Street, London. The Society has published Conder, 'Survey of Eastern Palestine' (1900); Clermont-Ganneau, 'Archæological Researches' (1896); Hull, 'The Geology of Palestine and Arabia Petræa' (1886); Tristram, 'The Fauna and Flora of Palestine' (1884), and many other works. See PALESTINE.

**Palestrina**, Giovanni Pierluigi, jō-vān'nē pē'ēr-loo-ē'jē pā-lēs-trē'nā (or **Pietro Aloisio**), Da, Italian composer and reformer of ecclesiastical music: b. Palestrina (ancient Praeneste) 1526 (Haberl), or 1514 (others); d. 2 Feb. 1594. He studied in the school of music established in Rome by Claude Goudimel, and in 1551 was appointed by Pope Julius III. master of a choir of boys in the Julian Chapel, and was the first to receive the title of chapel-master. In 1554 he published a collection of masses dedicated to Pope Julius, who admitted him into the college of choristers of the pope's chapel. He was soon appointed chapel-master of St. John's Lateran, and six years later to the same post in Santa Maria Maggiore, in which he continued till 1571. About this time the Council of Trent, on re-assembling in 1562, had taken up, among other subjects, the abuses which had gradually sprung up in church music and which had grown to an intolerable height. Not only were masses founded on profane airs, often of the most frivolous kind, but the composers of the day, as their manuscripts show, not content with working upon popular airs which suggested the most unbecoming associations, actually imported the words of the profane melodies into their scores. A reform was entrusted to the pope, who appointed a commission to inquire into and regulate the matter. There was no such music in existence as the commission required, and Palestrina, almost the only composer from whose works some illustrative fragments could be drawn, was assigned the task of showing that the recommendations of the commission were as consistent with the requirements of art as they were with those of religious usage. In fulfilment of this important task he composed three masses for six voices, which by their artistic beauty and profound devotional feeling at once settled the question beyond dispute. One of them in particular, the 'Missa Papæ Marcelli,' so called in gratitude to his patron, at once established for him a position in the highest rank of musical genius, a place to which the subsequent advance of musical science has only confirmed his claim. In reward for this great achievement of his, Palestrina was appointed in 1571 chapel-master of the Basilica San Pietro at the Vatican, and musical director to the Congregation of the Oratory. He also became teacher of the musical school founded by Nanini. He likewise undertook the revision of the chants of the Missal and the Breviary. A complete edition of his works was published by Breitkopf and Hartel (1885-93). Consult: Cametti, 'Cenni Biografici di Giovanni Pierluigi da Palestrina' (1895), and the older work of Baini (1828).

**Palestrina**, Italy, a town in the province of and 23 miles east-southeast of Rome. It stands upon the slope of a hill and commands a

PALESTINE.



COURT OF ANTONIO, JERUSALEM.





## PALEY — PALGRAVE

magnificent view. It was a place of Greek origin, and had become important long before Rome existed. Under the Roman Empire as Præneste it attained great magnificence, and was often the residence of the emperors. It has numerous ancient remains, particularly those of an immense Temple of Fortune, but the only modern building of note is the Barberini Palace. Pop. 6,000.

**Paley, pā'li, William**, English divine and philosopher: b. Peterborough, July 1743; d. Bishop-Wearmouth 25 May 1805. He was educated at Cambridge and in 1766 became a fellow and tutor of Christ's College. In 1767 he was ordained a priest. He held the tutorship of his college for about ten years, and his lectures during this period, which were highly successful, contained the elements of his future works. In 1776 he married and gave up his fellowship. Law, bishop of Carlisle, had already presented him with the living of Musgrave in Westmoreland, to which he retired; and he afterward received two other small livings. In 1780 he became prebendary of Carlisle, and in 1785 chancellor of the diocese. In 1794 he was made prebendary of St. Paul's, and in 1795 sub-dean of Lincoln.

His principal works are: 'The Principles of Moral and Political Philosophy' (1785); 'Horæ Paulinæ' (1790); 'View of the Evidences of Christianity' (1794); 'Natural Theology, or Evidences of the Existence and Attributes of the Deity collected from the Appearances of Nature' (1802).

As a writer Paley was distinguished by clearness and cogency of reasoning, force of illustration, and lucidity of arrangement. He had little claim to originality, and has acknowledged in a general way his indebtedness to others; but what he borrowed he generally set in a clearer light, and developed with the practical sagacity and strong common-sense which characterize the best English writers.

In his 'Moral and Political Philosophy' he follows the principles of Locke. He rejected the theory of a moral sense invented by Hutcheson to save the morality of the school of Locke, and founded his system purely on utilitarianism. The idea of the 'Horæ Paulinæ,' long considered his most original work, is said to have been suggested by Doddridge. The 'Evidences of Christianity' is mainly founded on Lardner's 'Credibility of the Gospel History,' while Butler and others contributed to its completeness, and his 'Natural Theology' has been shown to be taken, without direct acknowledgment, from a work of Bernard Nieuwentyt, a Dutch philosopher of the previous century (1654-1718), on the 'Right Use of Contemplating the Works of the Creator,' an English translation of which appeared in 1718-19. The celebrated illustration of the watch is taken almost literally from Nieuwentyt. Consult: Biographies of Paley by Meadley (1809), Edmund Paley (1824), and Lynam (1825); also Stephen, 'English Thought in the 18th Century.'

**Palfrey, pāl'fri, Francis Winthrop**, American lawyer and soldier, son of J. G. Palfrey (q.v.): b. Boston, Mass., 11 April 1831; d. there 5 Dec 1889. He was graduated from Harvard in 1851, was commissioned a lieutenant-colonel in the Civil War and served with gallantry.

He resigned in 1863 owing to a severe wound and in 1865 was brevetted brigadier-general of volunteers. From 1872 he was register in bankruptcy. He wrote: 'A Memoir of William F. Bartlett' (1879); 'Antietam and Fredericksburg' in 'Campaigns of the Civil War' series (1882); etc.

**Palfrey, John Gerham**, American historian and Unitarian clergyman: b. Boston, Mass., 2 May 1796; d. Cambridge, Mass., 26 April 1881. He was graduated from Harvard University in 1815, studied theology and in 1818 accepted the pastorate of the Brattle Street Congregational-Unitarian Church, Boston, succeeding Edward Everett. He resigned in 1830 to accept the chair of sacred literature at Harvard where he remained until 1839, during which period he was dean of the faculty and one of the three preachers at the university chapel. In 1835-43 he was editor of the 'North American Review' and early allied himself with the anti-slavery movement; he delivered a course of lectures at Lowell Institute, Boston, in 1839 and in 1842, and in the latter year was elected to the Massachusetts legislature where he served until 1843. In 1844-8 he was secretary of the commonwealth of Massachusetts, and in 1847-9 served in Congress; from 1861-7 was postmaster at Boston and subsequently acted as United States delegate to the Anti-slavery Congress in Paris. He wrote much and forcibly in opposition to the slave power, was an editor of the 'Commonwealth' in 1851 and contributed to the Boston 'Whig' a series of articles, 'The Progress of the Slave Power,' which attracted much attention. He allied himself with the Free-soil party and was their candidate for governor in 1851. Among his publications are: 'Evidences of Christianity' (1843); 'The Relation Between Judaism and Christianity' (1854); 'A History of New England from the Discovery by Europeans to the Revolution of the 17th Century' (1866); etc. The last is his greatest work and a supplementary volume was added by his son F. W. Palfrey (q.v.), 'The History of New England from the Revolution of the 17th Century to the Revolution of the 18th Century' (1890).

**Palfrey, Sara Hammond** ('E. FOXTON'), American novelist and poet, daughter of J. G. Palfrey (q.v.): b. Boston, Mass., 11 Dec. 1823. She has published: 'Prémices,' poems (1855); 'Hermann' (1866); 'The Blossoming Bud, and Other Poems' (1887); 'King Arthur in Avalon and Other Poems' (1900); 'Katherine Morne.'

**Palghat, pāl-gāt'**, India, town in Malabar district, Madras, 74 miles east of Beypur, and a station on the Madras railway. It does a flourishing business with the western coast, has a Swiss Protestant missionary station, libraries, reading-rooms, schools, and Victoria Jubilee College. Captured by the English in 1768 it served as base of operations against Tippu Sahib. Pop. about 50,000.

**Palgrave, pāl'grāv, Sir Francis**, English historian: b. London July 1788; d. Hampstead 6 July 1861. He was son of a Jewish stockbroker; was carefully educated at home; wrote a French version of the Homeric 'Batra-chomyomachia' at eight; studied law; was married and became a Roman Catholic in 1823, when he changed his name from Cohen to Palgrave.

his mother's maiden name. He practised only in pedigree cases, devoting himself to antiquarian studies; contributed largely to the 'Quarterly' and 'Edinburgh' reviews; edited for the Crown 'Parliamentary Writs,' 'Rotuli Curie Regis,' 'Kalendars of the Treasury of the Exchequer,' and 'Documents and Records Illustrating the History of Scotland'; and wrote 'History of England' (1831, only one volume), 'The Rise and Progress of the English Commonwealth' (1832); 'Truths and Fictions of the Middle Ages: the Merchant and the Friar' (1837); 'The Lord and the Vassal' (1844), and 'The History of Normandy and England' (1851-64). He was knighted in 1832. His work, though faulty in some details, did much to revive popular and critical interest in the Middle Ages.

**Palgrave, Francis Turner**, English poet and critic, son of Sir Francis Palgrave (q.v.): b. Great Yarmouth 28 Sept. 1824; d. 24 Oct. 1897. He was educated at Charterhouse and Oxford, becoming fellow of Exeter College in 1846. He was employed in the Education office after acting as Gladstone's private secretary for a time, and 1850-5 was vice-principal of Kneller Hall, a normal college at Twickenham. He became a friend of Tennyson with whom he passed many summers in Europe, and in 1884 resigned from the Education office, in which he had risen to the post of assistant secretary. In the following year he succeeded his old friend John Campbell Shairp as professor of poetry at Oxford. He was a man of remarkable sweetness of character, sensitive and cultured; his book, 'The Passionate Pilgrim' (1858), is a spiritual autobiography, which also gives some light on the facts of his life. He is best known as the critical editor of 'The Golden Treasury' of English lyrics (1861; 2d series 1896), the first volume of which ranks as a classic anthology. He edited several other volumes of selections, from Shakespeare (1865), of hymns (1867), of 'Stories for Children' (1868), of lyrics (1871), from Herrick (1877), from Tennyson (1885), etc., and wrote 'Visions of England' (1881), and 'Amenophis' (1892).

**Palgrave, William Gifford**, English diplomat and Orientalist, son of Sir Francis Palgrave (q.v.): b. Westminster 24 Jan. 1826; d. Montevideo 30 Sept. 1888. He was educated at Oxford; went to India immediately after graduation; and entered the Bombay native infantry, which he soon left to become a member of the Society of Jesus and to undertake missionary work in southern India. In 1853 he went to Syria as a Jesuit missionary. He narrowly escaped death in the Damascus massacre of June 1861, being saved only by his perfect coolness and his wonderful knowledge of native dialects and customs. In England, Ireland and France he attempted to rouse indignation at the Syrian massacres. Napoleon III. became interested in him, and in 1862 sent him across central Arabia to learn the feeling of the Arabs toward France,—an adventurous journey described in Palgrave's 'Narrative of a Year's Journey through Central and Eastern Arabia' (1865). He decided that there was no chance for Christian missions in Arabia, left the Society of Jesus, and entered the English diplomatic service. He was sent to Abyssinia in 1865, was British consul in Trebizond 1867, in St. Thomas 1873, in Manila 1876, in Bulgaria 1878, and in

Siam 1879, and in 1884 became minister to Uruguay. He wrote 'Herman Agha,' an Eastern romance (1872); 'Essays on Eastern Questions' (1872); 'Ulysses: Scenes and Studies in Many Lands' (1887), and 'A Vision of Life' (1891), a mystical poem.

**Pāli**, pālī, one of the most ancient of the Prākṛit dialects. Lassen traces it to western Hindustan, and declares it to be related to the Sauraseni and Māhārāṣṭrī. It was the sacred language of the southern Buddhists, and died out in India with their expulsion, but they carried it to Ceylon, Indo-China, and Burma, where it was superseded as a spoken language by the vernacular. Pāli is derived from a dialect much like Sanskrit, which it closely resembles. Pāli literature embraces the sacred writings of Buddhism, and also many works on ethical, philosophical, historical, and other subjects. The greater part of the Buddhist scriptures, or Pīṭakas, has been translated into English. One of the most interesting portions is the Jātakas, a complete translation of which has been published under the editorship of Prof. Cowell. The Pāli text was edited by Fausbøll. The Pāli works of a non-sacred character are: the Dīpavamsa, a history of Ceylon to 300 A.D., the Mahāvamsa, another history of Ceylon, written about the end of the 5th century A.D., the Dāṭṭavamsa, a history of Buddha's eye-tooth, the Milindapañha, a disputation between a Buddhist priest and the Greek king Milinda of Bactria, and the Rasavahini, a collection of fables and legends. Consult: Burnouf and Lassen, 'Essai sur le Pāli' (1826); Childers, 'Pāli Dictionary' (1875); Frankfurter, 'Pāli Handbook' (1883); Müller's 'Pāli Grammar' (1884).

**Palimpsest** Gk. *palin*, back, again, *psestos*, rubbed, a written page prepared by erasure for being filled with new matter. Both the Greeks and Romans erased manuscripts for the purpose of again using the parchment. Cicero banter his friend the lawyer Trebatius upon his economy in using palimpsests in his correspondence, and expresses the hope that it is his own consultations and not Cicero's letters that he erases. No ancient palimpsests have come down to us. Probably the use of them by the Greeks and Romans was attended with no disadvantage to literature. When, however, the Greek and Roman commonwealths had been overthrown, and almost all the ancient manuscripts preserved in Europe were in the monasteries, the use of palimpsests began to prevail in the Middle Ages. It is still a matter of controversy whether literature has gained or suffered by the practice. On the one hand, it is held that but for the value of their material, the scraps of ancient manuscripts which have come down to us in the form of palimpsests would have been lost. On the other, it is believed that valuable manuscripts have in this way been ruthlessly destroyed.

It was in the 7th century, when Caliph Omar had cut off the supply of papyrus furnished by Egypt, that a great deficiency of parchment was felt. This deficiency continued until the invention of paper. The use of palimpsests increased until the 11th century, when it reached its height. Some declare that nearly the whole of ancient literature was thus lost in the 8th century. From the time of the Renaissance this

practice was discountenanced; it was forbidden by edicts, but it did not entirely cease until the introduction of printing. In the East the use of palimpsests began much later, and never became so general as in the West. The scarcity of parchment was increased by the demand for legal documents. The monasteries of Bobbio, Fulda, St. Gall, and Mainz were among the most extensive manufacturers of palimpsests. That which replaced the ancient manuscripts was writing of an ecclesiastical character, lives of the saints, and copies of the church services.

At the Renaissance attempts were made to decipher the ancient and underlying writing on palimpsests, but it was not till the 18th century that any progress was made. Knittel (1761) deciphered fragments of a Bible of Ulphilas, and Bruno discovered some entirely new fragments of Livy and Cicero. Niebuhr and others made subsequent discoveries, and the subject was taken up systematically and pursued with great success by Angelo Mai (q.v.), librarian successively of the Ambrosian and Vatican libraries.

The processes employed in deciphering palimpsests vary according to the nature of the manuscripts. Those which have been scraped and rubbed with pumice-stone and afterward bleached are nearly indecipherable. Those which have been merely washed with lime-water and dried are revived by chemical processes. Various recipes which have been found successful are used successively till the right one is found. The result of the researches made is on the whole disappointing, because the monks only made use of imperfect copies and fragments of ancient writings for their palimpsests, and carried on the re-manufacture of clean parchments wholesale, mixing up various manuscripts, cutting them into fresh shapes, and thus obliterating forever the connection of the original works. A very large proportion of the discoveries thus made are fragmentary, but many of the fragments are of great value. The most remarkable discovery of a palimpsest in recent times is that of the Syriac version of the four Gospels by Mrs. Agnes Smith Lewis (q.v.) in St. Catherine's Monastery, Mount Sinai (1895).

**Pal'indrome**, the name given to any verse or line which reads the same either forward or backward; for example that which is put in the mouth of Satan — *Signa te, signa, temere me tangis et angis* (cross thyself, cross thyself, you touch and torment me in vain), or as "Madam I'm Adam."

**Palingen'esis**. See RECAPITULATION

**Palinuro**, pâ-lê-noo'rô, **Cape**, Italy, promontory in southern Italy, jutting into the Tyrrhenian Sea, northeast of the Gulf of Policastro, about 42° 2' N. and 15° 17' E., in classical times Palinurum Promontorium, and now sometimes called Cape Spartimento. The end of the cape forms a rocky and dangerous peninsula, on which Roman fleets were wrecked B.C. 253 and 36. The name is Greek and is the origin (not the outcome) of the story of the death and burial of Æneas' pilot, Palinurus.

**Pal'sade Cells and Parenchyma**, elongated cylindrical cells standing upright between the surface layer of the upper side of a leaf (q.v.) and the thicker layer of loose assimilation cells forming the under side. The palisade cells

characterize the "palisade parenchyma," which gives strength to the leaf and contains most of its chlorophyll.

**Palisades**, The, a rocky cliff on the right bank of the Hudson River (q.v.), extending from Fort Lee, N. J., to the hills of Rockland County, N. Y., a distance of about 15 miles. They are of basaltic trap rock, a formation which was intruded in a rift of the earth's surface between layers of sandstone and shale, and cooling in a columnar form, gave these cliffs their peculiar perpendicular formation. They are from 350 to 500 feet in height, broken and fantastic in appearance, and are considered one of the most remarkable and picturesque cliff formations in the world. A considerable amount of rock has been taken from the Palisades for building purposes, and it was feared that they would be badly injured and their beauty destroyed. The two States of New York and New Jersey therefore organized a commission in 1900, known as the Commission of the Palisades Interstate Park, the object of which is "to secure against vandalism and to preserve the natural beauty of the Palisades." To do this it was found necessary to acquire title to 73,900 feet of shore front; the late report showed about 30,000 feet of this was yet to be acquired, and that the total expenditures of the commission for land, buildings, improvements and riparian rights up to the date of report had been \$350,000,000.

**Palissy**, pâ-lê-sê', **Bernard**, English artist and philosopher: b. La Capelle Biron (Lot et Garonne), according to D'Aubigne 1499, according to other biographers about 1510; d. Paris 1589. Having been selected in 1543 to draw up the plan of a government survey in his neighborhood the remuneration he received enabled him to carry on experiments in enamels, to which his attention had been accidentally turned, and on which he had for some time been engaged. Being ignorant of the art of the potter he had to grope his way, making experiments with all kinds of materials, which for a long time were unsuccessful. He was compelled at last, by his own account, to burn his furniture in order to keep in his oven. The fatigue he endured in conducting himself all the operations necessary to the completion of his discovery was excessive. At length, after 16 years of unremunerated labor (1538-54), he succeeded in producing a pure white enamel, affording a perfect ground for the application of decorative art. He was now able to produce works in which he represented natural objects grouped and portrayed with consummate skill. His reputation rapidly spread, and he acquired a patron in the Duke de Montmorency. His sculptures in clay and his enamelled pottery once known became recognized as genuine works of art, and came into demand for the decoration of the houses of the great. Religious persecution, however, which had spared him in obscurity, fastened on him as soon as he had begun to attain to wealth and distinction. He was first imprisoned at Bordeaux on the charge of being a Calvinistic preacher (1562), and was threatened with death, when he was rescued by the Duke de Montmorency, who, to save him from the provincial authorities, procured him the title of *inventeur des rustiques figulines du roi*, with which he went to establish

## PALISSY WARE—PALLADIUS

himself at Paris. Here he was patronized by Catharine de' Medici, who gave him a site for his furnaces on the present situation of the palace of the Tuileries, where the remains of them were discovered in 1865. Here he continued to work for some years. He also gave for several years in Paris lectures on scientific subjects, the substance of which is probably contained in his 'Discours Admirables' (1580). He was the first in France to substitute facts and demonstrations in the teaching of science for mere hypotheses. He established a rational theory of crystallization, and his classification of salts was nearly perfect. His teaching again excited the jealousy of his theological opponents. He was arrested in 1588 and thrown into the Bastille, where he died at the age of 90, according to D'Aubigne, who knew him personally; or, of 80, according to his other biographers. His 'Complete Works' (1880) contain his famous autobiography. A monograph on the artistic work of Bernard de Palissy by C. De Lange and C. Borneman appeared in 1863-5. A biography of him has been written by Henry Morley (1852).

**Palissy Ware.** See PALISSY, BERNARD.

**Palk** (pâk) **Strait**, the northern and narrower part of the channel separating Ceylon from the southeastern coast of India, the southern and wider part being the Gulf of Manar. The strait is 80 miles long, 40 to 85 miles wide, but shallow and scarcely navigable. The Pambam Passage broken with islands connects the two parts of the channel.

**Pal'ki.** See PALANQUIN.

**Pall**, pâl (Lat. *palla*), generally, the covering of a bier, but specially applied to the small linen cloth, usually stiffened with cardboard, employed to cover the chalice. The upper part of the pall may be of silk, and colored according to the season. It is often richly embroidered. While part of the corporal is sometimes laid over the chalice as a covering, the pall or palla, according to Pope Innocent III., is not to be considered identical with the corporal.

**Pall-mall** (pêl-mêl') **Game**, an ancient pastime in which a round box-wood ball was struck with a mallet or club and sent through a ring elevated upon a pole, standing at either end of an alley. The game was formerly practised in Saint James' Park, London, and gave its name to the street called Pall Mall.

**Pallace'æ**, the stink-horn toadstools. See FUNGI.

**Palla'dian Architecture**, a variety of 16th century Italian architecture so named from Andrea Palladio (q.v.). It was founded upon the Roman antique as interpreted by the writings of Vitruvius, but rather upon the secular buildings of the Romans than upon their temples. It is consequently more applicable to palaces and civic buildings than to churches. A characteristic feature of the style is the use of engaged columns in façades, a single range of these often running through the two principal stories. It was introduced into England by Inigo Jones, a follower of the Venetian school of Palladio.

**Palladio**, pâl-lâ'dê'ô, **Andrea**, Italian architect: b. Vicenza, Venetian territory, 30 Nov. 1518; d. Venice 19 Aug. 1580. He was originally a stone-cutter, and at the suggestion of

the poet and savant Trissino (see TRISSINO, GIOVANNI GIORGIO), went to Rome for the purpose of studying ancient and modern art. Returning to his native country he designed many palaces, and country houses of great beauty and dignity. His designs were also sought in England and other parts of Europe. Palladio belongs to the masters who, in the 16th century, by the study of the works of Roman builders, created a new era in architecture. Among his works the theatre degli Olimpici, in his native place, is the most important. Venice also owes to him many of her finest buildings. The villa built by Lord Burlington at Chiswick (since enlarged by James Wyatt) was from a design of Palladio, as was also a bridge at Wilton, the seat of the Earl of Pembroke. The majestic simplicity of antiquity was always present to his mind, and Algarotti called him the Raphael of architects. His published works include 'Antichità de Roma' (1554); and 'Quattro Libri dell' Architettura.' He also provided designs for Barbaro's edition of 'Vitruvius' and illustrated Cæsar's 'Commentaries.' His life was written by Temanza (1763). Consult the biography by Fletcher (1902).

**Palla'dium**, among the Greeks, a statue or image of Pallas (Minerva), which is said to have fallen from heaven, and to have been found by Ilus, who placed it in a temple in his new city (Ilium). It was believed by the Trojans that their city would be invincible so long as it contained the Palladium. Ulysses and Diomedes, to remove this impediment to the capture of the city, are said to have carried it off. The Romans, however, pretended that it was brought to Italy by Æneas, and preserved in the temple of Vesta at Rome. It was considered holy and the protecting divinity of the city. The term palladium has figuratively acquired the sense of bulwark, protection, sanctuary.

**Palladium**, atomic weight 106.5, a metal resembling platinum, discovered by Wollaston (1803) while purifying a quantity of crude platinum. Occurs native in platinum ores, but principally alloyed with gold and silver in a gold ore from Brazil. Obtained from these ores by complicated processes which ultimately give the palladium as palladium cyanide. This decomposes on ignition, giving pure spongy metallic palladium. A ductile, malleable, white metal, specific gravity 11.8 and having the lowest melting point of all the platinum metals. It is not acted on by atmospheric oxygen or moisture, slowly attacked by strong nitric, hydrochloric, or sulphuric acids, but very easily by aqua regia. In the spongy form it has the power of absorbing gases. Freshly ignited palladium will absorb about 350 times its own volume of hydrogen at room temperature and nearly twice as much when heated to the temperature of boiling water. It forms two compounds with oxygen PdO, palladous oxide, and PdO<sub>2</sub>, palladic oxide. Two classes of salts are known related to these two oxides, the palladous salts being the most important. Palladium is used in the manufacture of many fine scientific instruments because of its properties of hardness, color, and resistance to the action of the atmosphere.

**Palladius**, pâl-lâ'dî-ûs, Greek patristic writer of the 4th century. His 'Historia Lausiaca' dedicated to Lausus, chamberlain of

the imperial court, gives us the results of his journeys among the principal districts of the Roman empire, where monks and hermits had settled. He is indeed the Herodotus of the early Church, whose self-chosen task was to travel from one religious house or colony to another, curiously inquiring about the life of each, and picking up from the gossip of the highway or actual observation a rich fund of information which has enabled him to give a living picture of the ascetic phase of church life in Palestine, Egypt and Syria. His works are published in Migne's 'Patrologia Græca,' Vol. XXXIV. Consult Preusschen, 'Palladius and Rufinus' (1897).

**Palladius**, pā-lā-dī-ūs, **Rutilius Taurus Æmilianus**, a Roman writer of the 4th century of our era. He wrote 'De Re Rustica,' a didactic work in 14 books on agriculture, the topics being arranged according to the seasons, and forming a sort of farmers' calendar. The first book is introductory, and the last, written in elegiac distichs, is a poem on the art of grafting, the other 12 containing accounts of the agricultural and gardening operations for each of the 12 months. Much of the work is simply borrowed from earlier writers. The poem was popular in the Middle Ages, and there is an English translation of it belonging to the 15th century. An English translation by Thomas Owen appeared in 1803, and others have followed.

**Pal'ah**, or **Impalla**, a large reddish, bush-ranging South African antelope (*Æpyceros melampus*), called 'roibok' by the Boers. The horns were lyrate, abruptly bent, and were possessed by the males alone. These animals were formerly numerous, but were not only especially a prey to the large carnivores, but were shot wrathfully by Boers and sportsmen, because they were extraordinarily suspicious and alarmed all the game in the neighborhood by loud whistling cries the moment they discovered a hunter's presence. Now, therefore, they are rare. Consult the works of sportsmen-naturalists in Africa; and Lydekker, 'Book of Antelopes' (1896); Sclater, 'Fauna of South Africa, Mammals' (1900).

**Pallas**, pāl'as, freedman and favorite of the Roman emperor Claudius: d. 63 B.C. He was a slave of Antonia, mother of Claudius; was set free by his master when he became emperor; together with Callistus and Narcissus was the real power during Claudius' reign; induced the emperor to marry Agrippina, his own niece, and to adopt Nero; and with the connivance and assistance of Agrippina, now his mistress, poisoned Claudius and brought Nero to the throne. He was subsequently poisoned by Nero's order.

**Pallas**, pāl'lās, **Peter Simon**, German naturalist and traveler: b. Berlin 22 Sept. 1741; d. there 8 Sept. 1811. He studied there, in Leyden, and in England, devoting himself especially to the classification of collections of zoological specimens, and in 1768 was invited by Catharine II. of Russia to become adjunct of the St. Petersburg Academy and to lead a scientific expedition through Russia in Asia. This trip of exploration, undertaken with Sokoloff, Suyeff, and Rytchkoff, and lasting more than six years, was his greatest work, the specimens collected

forming the nucleus of the Academy's museum in St. Petersburg. In 1777 he became a member of the Imperial Topographical Survey, and in 1787 was appointed historiographer of the College of Admiralty. He retired in 1796 and returned to Berlin not long before his death. His published works include a description of his travels in Asia (1771-6), 'Flora Rossica' (1784-1815); 'Icones Insectorum' (1781-98), a study of the Mongolian races (1776-1802); and a great and incomplete 'Vocabularium Linguarum totius Orbis' (1787-9).

**Pallas**, pāl'as, in astronomy, one of the minor planets revolving round the sun between Mars and Jupiter. It was discovered in 1802 by Olbers at Bremen. It revolves round the sun in 4.61 years. The eccentricity of its orbit is 0.23969, and its semi-axis major is 2.77 times that of the earth's orbit. Its diameter is 172 miles. When nearest the earth in opposition Pallas shines as a full seventh-magnitude star, with a decided yellowish light.

In Greek mythology, the goddess of wisdom. See **ATHENE**; **MINERVA**.

**Pallavicino**, pāl-lā-vē-chē-nō, **Ferrante**, Italian satirist: b. Plaisance 23 March 1615; d. Avignon 5 March 1644. He took orders; became a canon of Augustine; had to escape to Venice because of his broken vows; wrote there against Odoardo, duke of Plaisance, but had to leave Venice in turn because of his immoral life and writings; spent some time in Germany; again went to Venice, where he was imprisoned, but soon set free; then broke entirely with the Church and bitterly and foully attacked the Pope in 'Il Divorzio Celeste.' Venturing into France he was arrested by the papal officers, found guilty of heresy, and beheaded.

**Pallavicino**, **Sforza**, Italian cardinal and ecclesiastical historian: b. Rome 1607; d. there 1667. He was educated in the Collegio Romano; was made governor successively of Iesi, Orvieto, and Camerino by Urban VIII.; at 30 entered the Jesuit order; soon afterward became professor of philosophy and theology in the Roman College; and made such a name by his philosophical treatises that he was chosen by the Catholics to write a party history of the Council of Trent which refuted the work of Paolo Sarpi.

**Pal'len**, **Condé Benoist**, American journalist and author: b. St. Louis, Mo., 5 Dec. 1858. He was graduated from Georgetown University in 1880 and was editor of 'Church Progress,' a religious weekly in St. Louis, 1887-97. He has published 'The Philosophy of Literature' (1897); 'Epochs of Literature' (1898); 'What is Liberalism?' (1899); 'The New Rubaiyat,' a poem (1899); 'The Feast of Thalarchus' (1901); 'The Death of Sir Launcelot and Other Poems' (1902).

**Palliser**, pāl'i-sēr, **Sir William**, British inventor and engineer: b. Dublin 18 June 1830; d. 4 Feb. 1882. He passed through the Staff College at Sandhurst, and in 1855 obtained a commission in the Rifle Brigade, was subsequently transferred to the Hussars, and retired from the army in 1871. Besides inventing the projectiles and guns which bear his name he devised many improvements in fortifications, etc. He was knighted in 1873, and for a few years sat in the House of Commons as member for Taunton. See **PROJECTILES**.



## PALLIUM — PALMA

**Pallium**, an article of ecclesiastical dress consisting of a band of white wool, some three inches wide, with two narrower bands of the same material, one of which hangs down the back and the other over the breast. It is embroidered with four purple crosses. It is a part of the vestments of the pope, patriarchs, and archbishops. It is sent by the pope to the patriarchs and archbishops as a token that they are invested with the fullness of the episcopal office. It is sometimes, though rarely, also sent to bishops. When a bishop is elected or appointed to a metropolitan see, he at once solicits the pallium from the pope within three months after his consecration or confirmation. The pallium is made from the wool of two lambs annually presented in the Church of St. Agnes, Rome, by the apostolic sub-deacons, and woven by the nuns of Torre de' Specchi, to whom alone belongs the privilege. The historical origin of the pallium is not known, or, at least, wrapt in such obscurity that no definite conclusion has ever been arrived at. Some writers believe that it was first conferred upon bishops by the emperors as a mark of dignity, and then passed over to a purely ecclesiastical usage. It is only worn on solemn and special occasions. Consult: Thurston, 'The Pallium' (London 1802); Vespasiani, 'De Sacri Palli Origine' (Rome 1856).

**Palm**, pām, **Johann Philipp**, Bavarian bookseller and publisher: b. Schorndorf, Bavaria, 1768; d. Braunau, Bohemia, 26 Aug. 1806. The firm of which he was a member published a pamphlet, 'Germany in Her Deepest Humiliation' (1806), which was hostile to Napoleon and his measures. It was brought to the attention of Napoleon who ordered the arrest of Palm, had him tried by court-martial, and though the pamphlet was to the publisher merely trade matter, he was sentenced to death and executed at Braunau on the following day. This act aroused the deepest indignation in Europe as well as in Germany where the hatred of the Germans for Napoleon was already intense. Consult Schultheiss, 'Johann Philipp Palm' (1860).

**Palm Butter, Oil, Sugar, Wax.** See **PALMS**.

**Palm-cat**, or **Palm-civet**, any of several animals of the civet family (*Viverridae*), and of the genus *Paradoxurus*, known also as tree-cats, toddy-cats, from their habit of climbing palm-trees to eat their fruit. They inhabit India and southeastern Asia, the Malay Archipelago, etc., and somewhat resemble large cats with comparatively short legs. The best known is the Indian species (*P. niger*), which is often kept about houses and subsist mainly on animal food, such as rats, small birds, lizards, etc. Consult: Blanford, Jerdon, Blyth, Wallace, and other authorities on East Indian zoology; and Allen's Natural History, article 'Cats, Civets, and Mongoose' (1894).

**Palm-crab**, a large burrowing land-crab which feeds upon cocoanuts. See **ROBBE-CRAB**.

**Palm-kale**, a variety of cabbage extensively cultivated in the Channel Islands and also in Italy. It grows to the height of 10 or 12 feet, and with a crown of leaves at top it has much the aspect of a palm.

**Palm Oil.** See **PALMS**.

**Palm Sunday**, the Sunday next before Easter Day, so called because on that day is celebrated Christ's last entry into Jerusalem before his Passion, where palm branches were strewn in his way by the multitude. In some churches palms are employed as decorations at the services on this Sunday, and fragments of them distributed to the people.

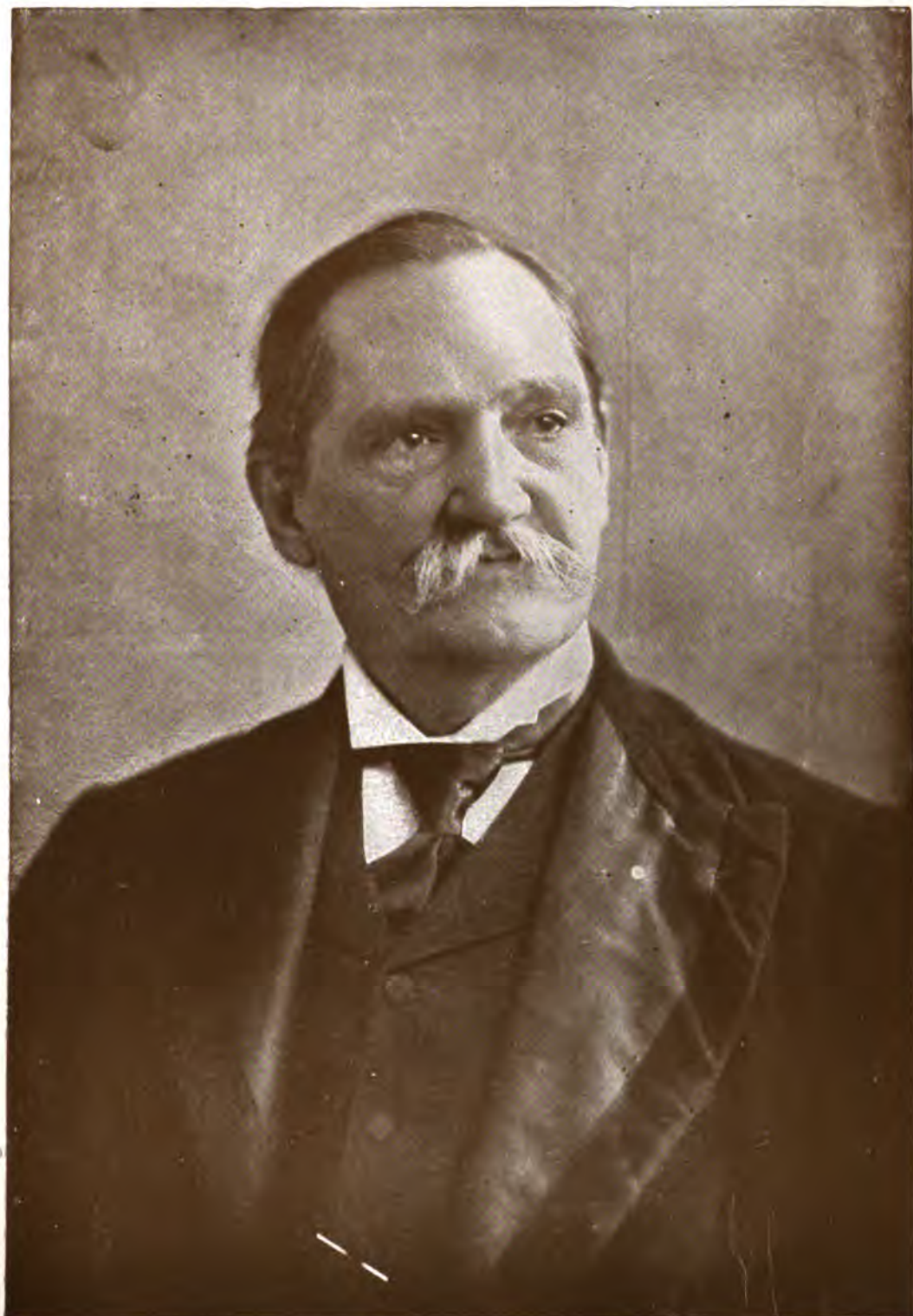
**Palm-swift.** See **SWIFT**.

**Palm-weevil**, or **Grugru**, a large curculionid beetle (*Rhyncophorus palmarum*), 1½ inches long, common throughout the American tropics, which places its eggs in holes bored by the beak of the female in the wood of palms, especially the cabbage palms of the genus *Euterpe*. The grub, as soon as hatched, begins to eat its way forward to the spongy pith of the tree, where it feeds and grows into an exceedingly fat and oily creature, sometimes three inches long by one in diameter, which is eaten roasted by all kinds of people, and eaten with pepper is regarded as one of the delicacies of the tropics. Similar species occur elsewhere in warm countries. The species above mentioned (*R. palmarum*) also occurs in southern California; and a similar species (*R. cruentatus*) infests the palmetto of the Southern States. Java has a well-known species (*R. ferrugineus*), whose grub has long been a table-delicacy in the East. Consult Kirby and Spence, 'An Introduction to Entomology' (1828), and general works.

**Palma**, **Giacomo**, jā-kō'mō pāl'mā, called **IL VECCHIO**, Italian painter: b. probably, Serintola, near Bergamo, about 1480; d. Venice 1528. He is supposed to have been a pupil of Giovanni Bellini, but little is known regarding his life. It may be divined from the pictures that go by his name that he imitated one after another several great artists of the Venetian school and many of his works have been attributed to Giorgione, whose coloring he took for his standard of excellence. The Italian churches have multitudinous examples of paintings called "Santa Conversazione" representing the Virgin and the Child, and the donor of the picture presented to them by his patron saint. Of these large compositions Palma Il Vecchio painted very many. He was also successful in mythological subjects, and his landscape backgrounds are exquisite. His works place him among the foremost painters of his time. Some of his best known paintings are 'Adoration of the Shepherds'; 'The Holy Family'; 'Mars and Venus'; 'The Mystical Marriage of Saint Catherine'; 'Divine and Heathen Love'; 'Portrait of Andrea Palladio in his Youth.'

**Palma**, **Giacomo**, called **IL GIOVANE**, Italian painter, grand-nephew of the Elder Palma: b. Venice about 1544; d. there 1628. His early work was excellent, comparing in fresh coloring with Titian, who greatly influenced him. Later his vicious mannerism grew so as to be a predominating feature of his work. Hence Lanzi called him the last good and first bad painter of Venice.

**Palma**, **Ricardo**, Peruvian author: b. Lima, Peru, 7 Feb. 1833. He was exiled to Chile in 1860 as a result of implication in a political revolt, but upon his return became secretary to President Balta. Later he served as senator and then was assistant in the National Library.



THOMAS ESTRADA PALMA,  
Late President of the Cuban Republic



## PALMA — PALMER

After the sack of the library by the Chileans in 1881 he reorganized it, gathered the remaining fragments, and assisted by gifts from foreign governments succeeded in re-opening the library in 1884. He is the author of several works of fiction, some poetry, and the historical work 'Anales de la Inquisición de Lima' (1863). Since 1870 he has been occupied in recording the traditions and legends of Peru.

**Palma, Thomas Estrada**, Cuban patriot: b. Bayamo, Santiago province, Cuba, 15 July 1835; d. Santiago Province, Cuba, 4 Nov. 1908. He studied law, but did not practice; during the revolution of 1868-78 rose to be a general in the Cuban forces; after nearly 9 years of service was captured and imprisoned in Spain until the close of the insurrection. At the time of his imprisonment he had succeeded Cespedes in the rather empty honor of president of the Cuban provisional government. After his release he went to Honduras, where he became postmaster-general of the republic. Later he removed to the United States, where he opened a school for Latin-Americans at Central Valley, N. Y. This institution he successfully conducted until the beginning of a fresh revolt in Cuba in 1895, when he was elected delegate-at-large and minister plenipotentiary of the Cuban republic, and took charge of the well-known Junta in the United States, which purchased arms, organized filibustering expeditions, and otherwise aided the army in the field. In 1901 Palma was almost unanimously elected president of the republic, and on 20 May 1902 was inaugurated, the United States on that day turning over to the new government the administration of the internal affairs of the nation. On 23 Sept. 1905 he was again elected to the office of president but resigned 28 Sept. 1906. See CUBA — History.

**Palma**, (1) the capital of Majorca (q.v.), the largest of the Balearic Isles, and of the Spanish province of Baleares, on the Bay of Palma indenting the south coast. The city, encircled by a fortified wall, stands in the midst of orange plantations, and with its Moorish architecture has a very picturesque effect. It is one of the most aristocratic of European cities. A railway connects it with Manacoor on the east coast. Its chief edifice is the Gothic cathedral (1322-1601); it contains the tomb of King Jayme II. of Aragon, and a valuable collection of church ornaments. In the church of Saint Francis is the tomb of Raymond Lully (q.v.). Other notable structures are a fine exchange (1426-46), an old Moorish palace, a 16th-century town hall, and several fine modern buildings and institutions. Its numerous manufactures include woven silks and woollens, jewelry, etc., and it has a considerable trade in wine, oil, cattle, and agricultural produce, the total annual value of its commerce averaging \$8,000,000. Its fine harbor is protected by a mole. Pop. about 68,000.

(2) A town of Sicily, 14 miles southeast of Girgenti. Pop. 11,702. (3) The name of one of the larger of the Canary Islands (q.v.).

**Palma Christi**. See CASTOR-OIL PLANT.

**Palmas**, päl'mäs, Cape. See CAPE PALMAS.

**Palmer, pä'm'ér**, Alice Freeman, American educator: b. Colesville, N. Y., 21 Feb. 1855; d. Paris, France, 6 Dec. 1902. She was graduated

from the University of Michigan in 1876 and was the next year a teacher of the classics and mathematics at Geneva Lake, Wis. From 1877 to 1879 she was principal of the high school at East Saginaw, Mich., becoming in the last-named year professor of history in Wellesley College. In 1882 she became acting president, and in 1882 president of that institution, which position she retained till her marriage in 1887 to Professor G. H. Palmer (q.v.) of Harvard University. During her administration the college standard of scholarship was raised, the number of students very greatly increased, and several important buildings added. In 1892-5 she served as non-resident dean of the woman's department of the University of Chicago. She took an active interest in educational and reform associations, was a member of the Massachusetts State board of education from 1889, and lectured frequently on educational and municipal topics. In 1882 she received the degree of Ph.D. from the University of Michigan, and that of L.H.D. from Columbia in 1887, while in 1895 she and her husband each received the degree of LL.D. from Union University.

**Palmer, Anthony**, American colonial governor: b. England about 1675; d. Philadelphia, Pa., May 1749. He was a merchant in Barbados for some time, but in 1707 purchased a large tract of land in Philadelphia where he then settled. In 1708 he was a member of the provincial council and served until his death. When Lieutenant-Governor George Thomas resigned in 1747 the government devolved upon Palmer, who was president of the executive council, and during the succeeding 18 months he administered the affairs of the colony with much ability. He conciliated the Indians and took precautions for the military defense of the colony against Spain and France, though opposed by the Quaker members of the council. The "Kensington District" of Philadelphia was originally a portion of his farm.

**Palmer, Sir Charles Mark**, English iron-master and shipbuilder: b. South Shields 3 Nov. 1822; d. London 4 June 1907. He was educated for a commercial career in France; was partner in several coal companies; reformed the coal-carrying trade from the north of England by building screw colliers (1852), which drove the sailing brigs out of business; and at Jarrow established a great shipyard. Both iron and coal for this yard are supplied by Palmer's own mines. He introduced the use of rolled plates for men-of-war, held several important government contracts; and was a member of the House of Commons 1874-1907. He was made a baronet in 1886.

**Palmer, Edward Henry**, English Oriental scholar: b. Cambridge 7 Aug. 1840; d. Arabia 11 Aug. 1882. He was educated at St. John's College, Cambridge, and later made extensive journeys of exploration in the East. In 1871 he was appointed professor of Arabic at Cambridge, and from that time onward accomplished a vast amount of literary work. In 1874 he was called to the bar. In 1882 he was engaged by the British government to assist in keeping the Arabs of the Sinai region quiet, and preventing them from interfering with the Suez Canal, when he was captured and murdered with two other Englishmen. He had a remarkable knowledge of Oriental life and language, and was a

## PALMER

man of very varied gifts. His works include: 'Oriental Mysticism' (1867); a 'Grammar of the Arabic Language' (1874); 'A Concise Dictionary of the Persian Language' (1876); 'The Song of the Reed' (1877), comprising Persian verse translations and original poems; 'The Poetical Works of Behá-ed-Din Zohair of Egypt, with a Metrical English Translation, Notes, and Introduction' (1876-7); a translation of the Koran ('Sacred Books of the East,' 1880); a 'Life of Haroun Alraschid' (1881); an Arabic Manual (1881); and a 'Simplified Grammar of Hindustani, Persian, and Arabic' (1882). Consult 'Life' by Besant (1883).

**Palmer, Erastus Dow**, American sculptor: b. Pompey, N. Y., 3 April 1817; d. Albany, N. Y., 9 Mar. 1904. His best known works were 'Morning and Evening'; 'The Angel of the Sculpture'; 'The White Captive'; 'Landing of the Pilgrims' (a group of 15 life-size figures intended for the Capitol at Washington). He also executed many portrait busts, and statues, including the statue of Robert R. Livingston in the National Capitol.

**Palmer, Frederick**, American journalist: b. Pleasantville, Pa., 20 Jan. 1873. He was educated at Allegheny College, Meadville, Pa., and was a London newspaper correspondent 1895-7, during the Greek war, 1897, and from the Klondike and Philippines 1897-8. He has published 'Going to War in Greece' (1897); 'In the Klondike' (1899); 'The Ways of the Service' (1901); 'The Vagabond,' a novel (1903).

**Palmer, George Herbert**, American educator and classical scholar: b. Boston 19 March 1842. He was graduated from Harvard in 1864, studied at the University of Tübingen 1867-9, and at Andover Theological Seminary in 1870; and after serving as an assistant professor at Harvard 1873-83, and professor of Philosophy 1883-9, became Alford professor of natural religion there in 1889, which position he still holds. He has published a rhythmic prose translation of the Odyssey (1891); 'The New Education' (1887); 'The Glory of the Imperfect' (1898); 'Self Cultivation in English' (1897); 'The Antigone of Sophocles,' a translation (1899); 'The Field of Ethics' (1901).

**Palmer, James Shedden**, American naval officer: b. New Jersey 1810; d. St. Thomas, W. I., 7 Dec. 1867. Entering the navy in 1825 as midshipman, he was made lieutenant in 1836. In the war with Mexico he commanded the Flirt, a blockade-schooner, in 1855 became commander, and when the Civil War broke out was with the Mediterranean squadron and in command of the Iroquois. Recalled from that station, he joined the blockading fleet under Admiral Dupont. In 1862 he was promoted to a captaincy, and in the passage of the batteries at Vicksburg held the advance of the Union vessels. At New Orleans and Mobile Bay he performed important services as flag-captain to Farragut, with whom his relations were most intimate. Made commander in 1863, he rose to the rank of rear-admiral in 1866, and until his death was in command of the North Atlantic squadron.

**Palmer, John McAuley**, American soldier and politician: b. Eagle Creek, Scott County, Ky., 13 Sept. 1817; d. Springfield, Ill., 25 Sept. 1900. He attended Shurtleff College, Upper

Alton, Ill., for a year, and later studied law and was admitted to the Illinois bar in 1839. He first entered politics in the campaign of 1840, when he actively supported Van Buren; in 1843 he was elected probate judge of Macoupin County; in 1847 was a delegate to the State constitutional convention; and in 1849 was elected county judge. In 1852 he was elected to the State senate and re-elected in 1854. His opposition to the Kansas-Nebraska bill, however, led him to sever his connection with the Democrats, and ally himself with the Republican party. He was active in the organization of this party, was president of the Republican State Convention in 1856, and delegate to the National Convention of the same year and that of 1860. He was one of the representatives of his State at the Peace Conference in Washington 1861. At the outbreak of the Civil War he joined the army as colonel of an Illinois regiment, took part in the Springfield campaign, and in December 1861 was promoted brigadier-general; in 1862 he was made major-general, in 1863 given command of the Fourteenth corps, and later of the Department of Kentucky. He took part in the operations against Island No. 10 (1862), led a division at Murfreesboro (1862) and at Chickamauga (1863); as commander of the Fourteenth corps he was engaged in the battles of Chattanooga (1863), Kenesaw Mountain and Peach Tree Creek (1864), and in the Atlanta campaign. After the war he continued his law practice in Illinois, and in 1868 was elected governor of the State; during his administration he steadily resisted special legislation and the granting of special privileges. In 1872 he left the Republican party and supported Greeley for the presidency, and in 1876 was one of the most active supporters of Tilden. In 1890 he was nominated for United States senator by the Democrats, and elected, serving for six years. In 1896 he was nominated for the presidency by the Gold Democrats who refused to accept the regular nominations on account of the free silver plank of the platform. He wrote his autobiography, published under the title 'Personal Recollections of John M. Palmer.'

**Palmer, John Williamson**, American author: b. Baltimore, Md., 4 April 1825; d. there 26 Feb. 1906. He was graduated from the University of Maryland as a physician in 1847; was city physician in Baltimore 1849-50, and subsequently was connected with the staff of the Century and Standard dictionaries. Among his publications are: 'The Golden Dragon; or, Up and Down the Irrawaddi' (1853); 'The New and the Old; or, California and India in Romantic Aspects' (1859); 'After His Kind,' a novel (1886); 'The Poetry of Compliment and Courtship' (1867); 'For Charlie's Sake and Other Lyrics and Ballads' (1901); and 'Stonewall Jackson's Way,' one of the most popular ballads of the Civil War.

**Palmer, Nathaniel Brown**, American sea-captain: b. Stonington, Conn., 1799; d. 1877. He went to sea at 14 and in 1821 he commanded the sloop Hero which set sail from Yankee Harbor in South Shetlands on an exploring expedition. He discovered the land known as the Palmer Archipelago, which at the time was supposed to be a portion of the Antarctic continent. He followed a seafaring life until 1849 and was

## PALMER — PALMERSTON

afterward a director of the Fall River line of steamers.

**Palmer, Ray**, American Congregational clergyman and hymnologist: b. Little Compton, R. I., 12 Nov. 1808; d. Newark, N. J., 29 March 1887. He was graduated at Yale in 1830; studied theology and entered the Congregational ministry. He was pastor of churches at Bath, Maine, 1835-50, and Albany, N. Y., 1850-66; and secretary of the Congregational Union in New York city 1866-78. He was the author of many sacred poems, of which the best known is the hymn 'My Faith Looks Up to Thee,' included in very many collections of church hymns and translated into more than 20 languages. His published volumes are: 'Hymns and Sacred Pieces' (1865); 'Hymns of My Holy Hours' (1868); 'Voices of Hope and Gladness' (1880).

**Palmer, Samuel**, English painter: b. Newington, Lancashire, 27 Jan. 1805; d. Reidgate, Kent, 24 May 1881. He was a pupil in the antique school of the British Museum, and received some inspiration from his acquaintance with William Blake. His studies were for two years continued at Rome (1837-9) after which he devoted himself to water colors and became a member of the Water Color Society in 1854. While belonging to the ideal school of Turner and Wilson he confined himself entirely to water color and etching, in both of which departments he reached the highest excellence. Among his best-known pictures which are suffused with profound poetic feeling are: 'Dream on the Apennines' (1864); 'Curfew' (1870); and 'The Waters Murmuring' (1877). His finest etchings include: 'The Sleeping Shepherd'; 'The Skylark'; 'The Lonely Tower.' He translated the eclogues of Virgil and intended to illustrate them, but only lived long enough to complete one plate, 'The Opening of the Fold.'

**Palmer, Walter Launt**, American painter: b. Albany, N. Y., 1854. After studying under F. S. Church at Hudson, N. Y., he became the pupil of Carolus Duran at Paris and developed great skill in landscape painting. He was awarded a gold medal at the World's Columbian Exposition in 1893 and honorable mention at the Paris Exposition of 1900. His Venetian scenes and snowy landscapes are remarkably effective and among his best productions are 'Venice' (1882); 'January' (1887); 'Domes of La Salute'; 'End of a Winter Day'; and 'Under the Pines' (1896). He is a member of the National Academy and of the Society of American Artists.

**Palmer**, a term in mediæval times applied to a pilgrim who had visited the Holy Land and carried on his return a branch of the palm for a staff as a memorial of his journey. The name was also given to pilgrims who wandered from shrine to shrine without a fixed home, probably because many of the pilgrims who had been to Jerusalem were in the habit of doing so.

**Palmer**, Mass., town, Hampden County; on the Chicopee, Swift and Ware rivers, and on the Boston & A., and Central V. R.R.'s; 14 miles east of Springfield. It includes the villages of Palmer, Three Rivers, Bondsville, Thorndike, and Duckville, of which the first two are the most important. It was first settled in 1716 by

John Kingston, and was incorporated as a town in 1775; for several years previous to its incorporation (1741-52) it was called Kingston. It is an enterprising industrial town and manufactures cotton and woolen goods, carpets, wire, wire nails, hats, etc. It has a public and an association library. Pop. (1900) 7,801; (1910) 8,610. Consult: Temple, 'History of the Town of Palmer, Massachusetts.'

**Palmerin** (pāl'mēr'In) of England (PALMERIN DE INGLATERRA), a romance of chivalry in the style of 'Amadis of Gaul,' and in this class of literature regarded as second only to it in point of merit. It is this book, which, with 'Amadis,' Cervantes saves from the holocaust in 'Don Quixote.' It was long supposed to be the work of Francisco Moraes, a Portuguese, who published it in 1567 as a translation from the French, and in 1807 Southey published an English translation, attributing the original to Moraes, and credited him with modesty in not claiming the authorship. It has since been found to have been the work of Leon Hurtado, and to have been published originally in Spanish, in Toledo, in 1547. This story is in some respects a continuation of 'Palmerin de Oliva' (q.v.).

**Palmerin de Oliva**, pāl-mā-rēn' dā ō-lē'vā, a romance of chivalry, a feeble imitation of 'Amadis of Gaul,' first published in Salamanca in 1511. It has generally been considered to be of Portuguese origin; but Ticknor, in his 'History of Spanish Literature,' asserts that the author of it was a carpenter's daughter in Burgos. This is one of the books against which Cervantes inveighs as responsible for the mental condition of Don Quixote; and in the famous scene of the burning of the books of chivalry, he says: "This Oliva, let it be hewn in pieces and burnt, and let not the very ashes be left." A continuation by the same author, 'The Second Book of Palmerin,' which treats of the adventures of his sons, Primaleon and Polendos, appeared later.

**Palmerston**, pām'er-stōn, **Henry John Temple**, Viscount, English statesman: b. Romsey, Hampshire, 20 Oct. 1784; d. Brockett Hall, Hatfield, Hertfordshire, 18 Oct. 1865. He was educated at Edinburgh University and at St. John's College, Cambridge University, being graduated from the latter in 1806. In 1806 and 1807 he was the Tory candidate for member of Parliament from Cambridge University, and was both times defeated, but in 1807 was elected to Parliament from Newtown, Isle of Wight. In 1809 he succeeded Lord Castlereagh as secretary at war, and in 1811 was elected member of Parliament for Cambridge University. As secretary of war he carried out a vigorous reform of the details of administration; regulated the finances, paid off arrears, and reduced the previous confusion of the war office to order. He mainly confined himself in his parliamentary speeches to the business of his department, but also spoke on Catholic Emancipation, of which he was always a supporter. He retired from office in the Wellington ministry in 1828 with others of the Canning party. In 1830 he became foreign secretary in the Whig ministry of Earl Grey, and from this time continued a member and leader of the Whig party. In 1831 he lost his seat for Cambridge, but was elected to Parliament from Bletchingley, then from South



## PALMETTO — PALMISTRY

Hants, and in 1835 from Tiverton, which borough he continued to represent till his death. It was during his service as foreign secretary that he earned a reputation for vigilance and energy in the conduct of foreign affairs, and especially for guarding the interests of individual Britons abroad, which, while it increased his popularity at home, gained him enemies abroad. He succeeded in establishing and maintaining friendly relations with France so that the two nations acted in concert; took a leading part in gaining the independence of Belgium, and in establishing constitutional government in Spain and Portugal. He supported Austria and Turkey against Russia, in the East, and took part in the war against Mehemet Ali. In Parliament he supported the liberal policy of free trade and labor laws regulating hours, factory conditions, etc. He was foreign secretary till 1841, when the Whig ministry went out of office on the question of free trade in corn, but on the Whigs' return to power in 1846 he again took that office, under Lord Russell. During the period of 1848-9 he manifested his liberal tendencies and sympathy with the revolutionary party without active interference with the affairs of foreign states. Several of his acts in this administration aroused party criticism, especially his favoring the cause of a Portuguese Jew at Athens, Don Pacifico, a naturalized British subject, which caused a quarrel with Greece, and nearly produced a war with France. This was the occasion of a keen discussion of his policy in Parliament, which resulted in a formal vote in the House of Commons approving the foreign policy of the government. In 1851 he unofficially expressed to the French ambassador in London his approbation of the *coup d'état* of Louis Napoleon, without consulting either his colleagues or the Queen, and he was forced to resign. In the next year he defeated the Russell ministry on the question of the Militia Bill, but refused to accept a position in the cabinet under Lord Derby. In December 1852 he took office as home secretary in the coalition ministry of the Earl of Aberdeen, and on the resignation of this ministry, in consequence of alleged mismanagement of the Crimean war, he was on the almost universal demand of the country called to the premiership, and vigorously carried on the war with Russia. In 1857 Parliament, on the motion of Richard Cobden, passed a vote of censure on the conduct of the Chinese war; dissolution of the house gave Palmerston a majority, but in February 1858 he resigned, after being defeated on the Conspiracy Bill; he returned to power in June 1859, and continued to hold the premiership during the remainder of his life.

Among the important events of his administration were the American Civil War (with the recognition of the Confederate States as belligerents and the Alabama incident), the Prussian war against Denmark, which he opposed, and the union of Italy, which he strongly favored.

Consult: Dalling, 'Life of Lord Palmerston' (continued by Sir Evelyn Ashley); Francis, 'Opinions and Policy of Viscount Palmerston' (1852); Lorne, 'Biography of Lord Palmerston' (1891); Sanders, 'Life of Viscount Palmerston' (1888); and Trollope, 'Life of Lord Palmerston' (1882).

**Palmetto.** See **PALMS**.

**Palmetto Ranch, Engagement at**, the last engagement of the Civil War. On the evening of 11 May 1865 Col. T. H. Barrett, 62d United States colored infantry, in command at Brazos Santiago, Texas, sent Lieut.-Col. Bronson, with 300 men, to attack some Confederates on the Rio Grande, who were procuring horses to remount their cavalry. Marching by night, Bronson, early next morning, attacked about 200 Confederates at Palmetto Ranch, on the Rio Grande, seizing their camp and taking some prisoners, horses, and cattle. Bronson then fell back to White's Ranch, where he was joined on the morning of the 13th by Col. Barrett, with about 200 men of the 34th Indiana, under Lieut.-Col. Morrison. Barrett advanced in the direction of Palmetto Ranch, which the Confederates had reoccupied. He was met by cavalry, which was easily driven back; Palmetto Ranch was reached, the buildings and public stores burned, and after following the Confederates some distance Barrett retired to a hill about a mile from Palmetto Ranch where, about 4 P.M. he was attacked by Gen. J. E. Slaughter, with 675 men and six guns. The infantry and four guns attacked in front, while about 250 cavalry and two guns, under cover of a chaparral, flanked him and endeavored to gain his rear. Barrett had no artillery, and fell back fighting. About 50 men of the 34th Indiana were cut off and captured. The retreat was covered by a part of the 62d colored infantry, deployed as skirmishers, who resisted every effort of the Confederate cavalry to break the line, repelling several determined attacks. The running fight continued about three hours and then, at sunset, Confederate pursuit ended. Col. Barrett reports: "The last volley of the war, it is believed, was fired by the 62d United States colored infantry, about sunset of the 13th May 1865, between White's Ranch and the Boca Chica, Texas. The Union loss in the expedition was 115 killed, wounded, and missing. The Confederate loss is not known. Consult: 'Official Records,' Vol. XLVIII.; Lossing, 'History of the Civil War,' Vol. III.

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**Palmetto State**, a name applied to South Carolina. The palmetto tree appears on the coat of arms of the State. See **SOUTH CAROLINA**.

**Palmistry**, or **Chiromancy**, is the art of "reading the palm"—the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of the palm of his hand, and of the lines traced upon it. As a considerable body of very complicated rules and directions have been laid down by authorities, ancient and modern, to enable the student to read the palm, palmistry claims to be regarded as a "science," or at least as a branch of an interpretative science of the hand in general, to which the name *Chirosophy* has been given. The other branch of this general science has been called *Chiromony*, and is concerned with the interpretation of the form and character of the hand and fingers, while Chiromancy treats of the palm only. The science was known to the ancient Greeks and was somewhat popular on the continent during the Middle Ages. The chief authorities on palmistry in recent times are two Frenchmen, M. le Capitain D'Ar-

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pentigny, and M. Adrien Desbarrolles; and it is on their works that modern English books on the subject are chiefly founded. The observation of the fingers and joints on the hand is quite as important to the chiromant as that of the palm itself. The thumb is generally regarded as chiromonomically the most important part of the hand. The first, or upper phalange of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power. What has to be considered by the chiromant proper is the "mounts" of the hand, with the marks on them, and the lines in the palm. The "mounts" are the elevations at the base of the fingers and thumb and in the "percussion" of the hand—that is, the side of the palm which extends from the root of the little finger to the wrist; it is so called because it is used in striking. They are seven in number, and are named from the planets. When well developed the mounts indicate the possession of the quality associated with the respective planets—for example, Jupiter developed denotes pride and ambition; Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs. There are four principal lines, namely, the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette or the bracelets. These last (the bracelets), if well marked, strengthen the effect of the line of life, each bracelet indicating thirty years of life. The line of heart, if long, clear cut, and well colored, denotes an affectionate and devoted character; and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury. A good line of head—that is, a clear-cut, long, unbroken line—indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding headline shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn or fate, the line of Apollo, the line of liver or health, and the line of Venus. A long, clear-cut line of Saturn foretells a happy and prosperous life, breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; while the Venus line, when present, indicates a character very liable to be influenced by the passion of love. Marks on the mounts or lines, such as stars, crosses, etc., have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

**Palmitin**, or **Tri-palmitin**, a fatty substance occurring quite commonly in the natural fats and organic oils, and closely analogous to stearin in its chemical structure and deportment. It is especially abundant in palm oil, from which circumstance it derives its name. Tri-palmitin

may be conveniently prepared from palm oil by expelling the liquid portion by pressure, washing the solid residue with boiling alcohol to remove such other fats as it may still retain, and finally crystallizing from a solution in ether. By this process it is obtained in the form of white crystals which are scarcely soluble in alcohol but readily soluble in ether, and which melt at 144° F. Varieties of tri-palmitin are said to exist, however, which melt at 115° F. Chemically, tri-palmitin is a compound of palmitic acid,  $C_{15}H_{31}COOH$ , with glycerin,  $C_3H_5(OH)_3$ ; three molecules of the acid being combined with one of the glycerin, as indicated by the equation  $3C_{15}H_{31}COOH + C_3H_5(OH)_3 = 3H_2O + C_3H_5(C_{15}H_{31}COO)_3$ , the last formula on the right hand side of the equality sign being that of tri-palmitin. Two other compounds of palmitic acid with glycerin are also known, but they are of less importance. Mono-palmitin has the formula  $C_3H_5(OH)_2(C_{15}H_{31}COO)$ , and melts at about 140° F. It may be distilled in a vacuum, but when heated in the air it breaks up with the formation of acrolein and other products. Di-palmitin has the formula  $C_3H_5(OH)(C_{15}H_{31}COO)_2$ , and its melting point is given, by various authorities, at from 125° F. to 140° F. When a mixture of glycerin and palmitic acid is heated for 24 hours at 400° F., all three of the palmitins are formed; and when the product is shaken with lime water and then extracted with ether, and the ethereal solution is evaporated, tri-palmitin, di-palmitin and mono-palmitin separate out in the order named. The palmitins are readily saponified by heating with caustic alkalies, and free palmitic acid may be conveniently prepared by adding hydrochloric acid to an aqueous solution of potassium palmitate.

**Palms**, trees, or shrubs of the monocotyledonous family *Palmae*, ranking in economic importance next to the grasses. The species, of which about 1,000 are recognized, belong to about 130 genera. The great majority of these genera consist of only a few species, in many cases of only one. *Calamus* (the rattan palms) is the largest genus, consisting of about 200 mostly Asiatic species with no representatives in the Western hemisphere. *Geonoma* and *Bactris*, American genera, each contain about 100 species. The fourth, an American genus, is *Chamadorea* with about 60 species. The Asiatic and Australasian genus, *Licuala*, contains about 30 species. *Cocos*, an American genus with the exception of the cocoanut, which is cosmopolitan within the tropics, also contains about 30 species. *Desmonicus* (American), *Pinanga* and *Areca* (Oriental) each contain about 25 species. Geologists and botanists are fairly well agreed that the palms represent a once more extensively distributed and more numerous group of plants and that they are now upon the decline. Fossil remains are preserved in the rocks of the Middle Cretaceous, and, in North America, in those of the Upper Cretaceous from Greenland southward; in both Europe and North America they are also found in the Tertiary rocks.

With few exceptions the individual genera and even the tribes which they comprise are restricted in their distribution; certain tribes are African, other Asiatic or American, etc., and certain genera are found in very small areas; for instance, *Pseudophoenix sargentii* is found only in certain of the Florida Keys and even

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there in limited numbers, and the species of *Howea* only in Lord Howe's Island, a tiny speck of land in the Southern Pacific Ocean. Only one species (*Chamarops humilis*) is an acknowledged native of Europe. The most noted exception to this rule is the cocoanut palm (*Cocos nucifera*) which appears throughout the tropics upon maritime land. It is among the first plants to obtain a root-hold upon newly formed islands. As a group, the palms are almost restricted to tropical and subtropical countries; the European species mentioned, however, extends as far north as latitude 44; an American species, the palmetto (*Sabal palmetto*), to 35; some Asiatic species to 34. In the Southern hemisphere some American species reach latitude 36 S., some African 30 S. In Australia, latitude 35 S. is the limit; but in New Zealand one species reaches 38 S. There are, however, a few South American species which approach the perpetual snow line upon the mountains. With respect to habitat, the various species exhibit a wide range of adaptability, some, like the cocoanut, growing only upon the sea coast, others wholly inland; some in sand, others in rich alluvial soils; some in swamps, others on dry hillsides; some in exposed places, others in the depths of the forest; some solitary, some in groups, some in forests or jungles to the exclusion of other species of trees.

In general, palms are erect, unbranched trees with buttressed bases. They often attain heights of 100 feet and at the summits of the usually smooth or slightly ringed columns, they bear a rosette of large leaves, each of which resembles in some kinds a fan and in others a feather. In some species of the former type the leaves may exceed 40 feet in length and six feet in breadth; in the latter, 20 feet by four or more, without division. There are, however, exceptions to the ordinary columnar habit of growth; a few species are branching; some are low growing, even creeping; others are slender stemmed plants which climb by means of hooked spines; some have flexible stems which extend from tree to tree in festoons and attain several hundred feet, 500 feet being common, and some writers placing the length at 1,500 and even more. In the ordinary species the flowers are borne in huge clusters which appear from within spathe that open in some cases with a report. The fruits are of various kinds, berries and drupes being perhaps most common. They are often enclosed in a fibrous husk, and frequently contain a hard nut. The flowers, which are generally small and individually inconspicuous, bear no relation in size to the fruit, which may be as small as a pea or, as in the double cocoanut, larger than a man's head.

While the grasses are of widest economic importance among plants, the palms are employed for the largest number of purposes. All parts of the various species are used, but in few do more than two or three parts find extensive employment. Many palms furnish good fuel, some useful timber, others masts and spars. The pith of certain species, especially of *Metroxylon* and *Caryota*, supply sago. The thin, pliant stems of many species of *Calamus*, known commercially as rattan, are widely used throughout the world for wickerwork and furniture. The terminal bud of several kinds is cooked and eaten like cabbage, such species being known as

"cabbage palms"—for instance, *Euterpe oleracea*. The leaves serve for thatching houses, and as material for walls, mats, screens, shields, clothing, hats, bedding, cordage, twine, nets, etc. The spines of certain species are used for tipping arrows and spears, for tattooing, for fish-hooks, etc. The fibre of the leaves of many species seems to offer useful paper-stock; that of others, for example, the piassaba fibre (q.v.), derived from various species of *Attalea* (especially *A. funifera*) is extensively used for brushes of various kinds, ranging from hair-brushes to stable brooms and street-cleaning machines. The sap of several species is used for the manufacture of palm-wine and of arrack, the latter a spirituous liquor; it is also employed in making jaggery, a kind of sugar of some commercial importance. For this latter purpose *Phoenix sylvestris* is perhaps the principal species. In some cases the sap is obtained by tapping; in others by cutting the terminal bud or even the trunk near the base.

The fruits of many species are useful. As food the cocoanut and the date are probably the most widely known and important. The former is employed not only as a fruit, but its contained liquid or "milk" furnishes a palatable drink either fresh or prepared as a wine. The kernel supplies the "shredded cocoanut" employed in confectionery, cakes and puddings. It also yields cocoanut butter or oil. The fibre of the husk is widely used for matting and is very popular where great durability is essential, as upon the aisles of public halls. The shells make serviceable dippers, bowls, and other utensils, or when carved and polished, attractive ornaments. The date palm supplies the Arab and other peoples of northern Africa and southern Asia with one of their chief foods, for which purpose it is commonly seen near dwellings, besides being planted extensively for commercial purposes. The chief commercial supplies come from Arabia, Persia and Mediterranean Africa.

Oils are obtained from the fruits of a large number of species, especially *Elais guineensis*. Some of these oils are used for food, others for lubricating; some for illuminating; and others for soap and candle making. Usually these oils are orange-colored, violet-scented, and sweetish. They are generally obtained by boiling the ripe fruits in water, though also frequently by expression. Like butter, they soon become rancid unless kept cold. Palm butter is a popular name for several of the kinds. A palm wax is secured from species of *Copernicia*, and is used like beeswax.

The seeds of many species are very hard and are used for manufacturing small ornamental and useful articles such as knife handles, collar buttons, etc. Probably the best known of these is the so-called "vegetable ivory" (q.v.) which is derived from the *Phytelphas macrocarpa*, a South American species with a short or even creeping stem, from which arise pinnate leaves often more than 15 feet long. The seeds of *Areca catechu* are mixed with lime and pepper leaves to make the notorious "betelnut" (see BETEL) of eastern Asia. The product is used as a stimulant.

The most remarkable palm of all is perhaps the palmyra, deleb or borassus palm (*Borassus flabellifer*). This species is a native of southern Asia, the Australasian Archipelago and western

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Africa, where it sometimes exceeds 100 feet in height. The leaves, which often exceed three feet in length, have spiny-margined petioles; the triangular fruits are about five inches in diameter, have a brownish or black, glossy, succulent, fibrous rind, and contain three seeds about as large as goose-eggs. Throughout India this is the commonest palm, and in Ceylon it occurs in extensive forests. It is employed for more purposes than perhaps any other plant, upward of 800 uses being recorded for its various parts. Its wood, palmyra wood, is heavy, dark, hard, durable, easily polished, difficult to cut across the grain but easy to cut with the grain. It is used for house-building, furniture, etc. The wood of some other palms is also known by this name and as porcupine-wood. The leaf stalks make excellent fences. The leaves are employed for thatch, mats, umbrellas, fans, hats, baskets, as writing tablets, for ropes, twine, etc.; the down at the leaf-bases for lint, and for filtering liquids; the sap yields sugar, palm wine and arrack; the fruit is cooked as an esculent; the young seeds are similarly employed, and the young plants serve as pot-herbs. A large part of the population of southern India depends upon this plant to supply its needs—fuel, shelter, clothing, food, etc.

Among the most important palms the following with their chief uses may be mentioned: Assai or Para palm (*Euterpe edulis*), a South American species whose fruits are macerated in water to make a popular drink called assai; Bourbon palm, one of the most widely grown of greenhouse and house palms, usually called *Latania borbonica* by florists, but properly *Latania commersonii*; double Seychelles, or sea-cocoanut palm (*Lodoicea callipye*), chiefly noted for its great size, slow growth, enormous seeds weighing more than 10 pounds (even, it is said, more than 30 pounds), which from their seeming malformation but more particularly from their formerly unknown origin, gave rise to numerous fabulous tales; curly palm (*Howea belmoriana*) one of the best known greenhouse palms, and popularly called *Kentia belmoriana*; fan-palm, any species with fan-like leaves; fern-palm (*Cycas revoluta*, etc.), commonly raised in greenhouses; fish-tail, wine, or toddy palm (*Caryota urens*), a source of jaggery, arrack and palm wine; flat palm (*Howea fosteriana*), a favorite greenhouse palm popularly known as *Kentia fosteriana*; raphia palm (*Raphia*), which furnishes the raphia used by florists and nurserymen for tying up plants; Royal palm (*Oreodoxa regia*), so named in expression of its majestic appearance, and one of the most popular avenue-palms of warm countries; umbrella palm (*Hedyscopia canterburiana*); walking-stick palm (*Bacularia monostachya*); wine palm (*Caryota urens*); *Phanix sylvestris*; *Borassus flabelliformis*, and *Cocos butyracea*; gomuto or areng palm (*Arenga saccharifera*), which furnishes fibre used for cordage, canvas, etc., and sugar, wine, vinegar, etc.; inaja palm (*Maximiliana regia*), the spathe of which are used as baskets and as cooking utensils; doum palm (*Hyphæna thebaica*), one of the few branching palms; talipot palm (*Corypha umbraculifera*), noted for its prodigious fertility in flowers, the number of blossoms upon a single tree having been estimated at 60,000,000, the inflorescence attaining a height of 30 feet above the crown of leaves. The

"palm" of the Bible is believed to be the date-palm, which is one of the commonest species in Syria at the present time. The so-called Panama-hat palm (*Carludovica palmata*) is not a palm botanically, but a member of the order *Cyclanthaceæ*.

With the exception of the date and the cocoa-nut, palms are little cultivated, the wild species being relied upon for commercial purposes. Even these species and those used for sugar, arrack, etc., are usually planted in favorable situations and allowed to shift for themselves after once becoming established or even before. For ornamental purposes, however, more or less care is given the young trees used in warm climates for bordering avenues, and as lawn or garden specimens.

During the closing decade of the 19th century palms sprang into popularity as greenhouse and house plants, for which purposes, and for decorating halls, churches, hotels, lobbies, etc., about a dozen species have become deservedly popular, not only because of their graceful appearance, but because of their ease of cultivation. Many other species are also found in private conservatories. In the United States the chief centre of palm production for these purposes is the Middle Western States, but the South is also increasing its area devoted to ornamental palms. The plants are nearly all grown from imported seeds sown in warm greenhouses. In some cases the seeds require months or even more than a year to germinate; but usually a month or two is sufficient. In many cases the young seedlings resemble one another, whether they will develop into pinnate-leaved or fan-leaved specimens. At all times ample water and good drainage are essential; shading is also generally beneficial. The plants generally succeed best in well rotted sod obtained from rather light soil rich in humus. Scale-insects and the red spider are the chief enemies; the former may be controlled with kerosene emulsion (see FUNGICIDE); the latter by forcible spraying, moist atmosphere, and by evaporated (not burned) sulphur. The fumes of burning sulphur are fatal to the plants.

Consult: Bailey, 'Cyclopedia of American Horticulture' (New York, 1900-2); Martius, 'Historia Naturalis Palmarum' (Munich, 1823-50); Kerchoue de Denterghem, 'Les Palmiers' (Paris, 1878).

M. G. KAINS,  
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**Palmyra**, pāl-mī'ra, Asiatic Turkey, the Hebrew *Tadmor*, City of Palms, an ancient city of Syria, now in ruins, 140 miles east-northeast of Damascus, lat. 34° 24' N., lon. 38° 20' E. It was founded or enlarged by Solomon in the 10th century B.C. It is situated in an oasis of the Syrian Desert, with a ridge of hills to the west, and an extensive plain on the east. It is said to have been a bulwark of the kingdom of Israel against the wandering tribes of the desert, and was an entrepôt for the trade between Damascus and the Mediterranean, from which it drew considerable wealth. Palmyra was little heard of in history until the time of the Roman Empire. It is mentioned as having been attacked by Mark Antony, who hoped to find in it the means to pay his troops; but the Palmyrians transported their goods beyond the Euphrates, and he was compelled to leave without accom-

## PALMYRA—PALOS

plishing his object. During the earlier period of the empire it was independent, and carried on a considerable trade with Persia, India, and the Mediterranean. Subsequently, about 130, or according to other authorities later, it submitted to Rome, and became a Roman colony. The protection of Rome against its neighbors, the Parthians and the Persians, was of value, while the yoke of so distant a mistress was not heavy. It became the faithful ally of Rome in her wars against the Eastern powers. During the reign of Gallienus (260-8), Odenathus, the ruler of Palmyra, rendered such effectual assistance against the Persians that that emperor gave him the title of Augustus, and recognized him as his colleague. Odenathus was succeeded by his widow Zenobia, to whom Palmyra chiefly owes its fame, and who took the title of Queen of the East. She was besieged in Palmyra by Aurelian, and compelled to surrender. On his departure the Palmyrians revolted, on which Aurelian returned and destroyed the city (273 A.D.). He permitted the inhabitants to rebuild it, but it never recovered its importance. The remains of Palmyra are chiefly of the Corinthian order, with the exception of the Temple of the Sun, which is Ionic. They are supposed to belong to the period of Odenathus and Zenobia. See ZENOBIA. Consult Wright, 'An Account of Palmyra and Zenobia' (1895).

**Palmyra, Mo.**, city, county-seat of Marion County; on branches of the Chicago, B. & Q. railroad; about 14 miles northwest of Hannibal. It was settled in 1818, laid out in 1819, and incorporated in 1855. It is in a farming country and the chief manufactures are connected with farm products. It has a pickle factory, creamery, flour and grist mill, and a carriage factory. The educational institutions are Centenary High School (M. E. South), founded in 1884, and the Saint Paul's College (P. E.), founded in 1848 as the Ingleside Female College, and public and parish schools. Pop. (1910) 2,168.

**Palmyra Fibre.** See FIBRE.

**Palmyra Wood.** See PALM.

**Palni** (pāl'nē) Hills, mountain range of Southern India, joining the Eastern and Western Ghats, in the district of Madura, Madras presidency. The soil is fairly fertile and affords excellent pasturage. The climate is equable, comparatively dry and healthy, and there is a sanatorium at Kodikanal, 47 miles northeast of Madura.

**Palo, pā'lō**, Philippines, a pueblo of the island of Leyte, situated on the northeast coast at the mouth of the Malo Malo River, six miles south of Tacloban. It is an important road centre, being connected by road with Tacloban and other important towns to the south and west. Pop. 17,740.

**Palo Alto, pā'lō āl'tō**, Cal., town in Santa Clara County; on the coast division of the Southern Pacific railroad; 33 miles southeast of San Francisco and 18 miles northwest of San Jose. It was settled in 1891 by the opening of the Leland Stanford Jr. University (q.v.) which is located here. In 1892 a number of people established homes in Palo Alto on account of the university. It was incorporated in 1894. Palo Alto is a "university town," with but few

industrial establishments. The planing mills have about 30 employees; and there are stores sufficient to supply a limited amount of the local needs. There are eight churches, a high school, elementary graded schools, Manzanita Hall, a preparatory school for boys, and two preparatory schools for girls. The one bank has a capital of \$100,000. The town is governed by a board of five trustees. The town owns the water and electric-light plants and has a good sewerage system. Pop. (1910) 4,486, not including students.

**Palo Alto, Texas**, the name of a plain, or field, eight miles northeast of Brownsville (q.v.), Cameron County, where was fought, 8 May 1846, the first important battle of the war between the United States and Mexico. General Taylor with 2,000 U. S. troops was on the Rio Grande opposite Matamoros; and General Arista with a force of 6,000 Mexicans tried to cut him off from Point Isabel which was the base of U. S. supplies. Taylor attacked and defeated Arista; the Mexicans retreated to Resaca de la Palma (q.v.). The United States loss was four killed and 126 wounded; the Mexicans, 102 killed and 128 wounded. Consult: Howard, 'General Taylor' (1892); Bancroft, 'History of Mexico,' Vol. V.

**Palo'lo**, an annelid (of the genus *Eunice viridis*) found in great abundance in the sea near the coral reefs of tropical islands. They are taken in large numbers in autumn in nets by the islanders, who esteem them, when roasted, as a great delicacy. The body, about a foot long on the average, tapers toward both ends, and along each side are tufts of gills. An American species (*E. fucata*) abounds in various parts of the West Indies and Gulf of Mexico, but is not eaten.

These worms are interesting mainly on account of their extraordinary breeding habits. During the most of the year the worms lie coiled up in burrows in rotten coral-rock, or other friable material. When the eggs have ripened within the body, and the time for their discharge has come (which happens in early November in the South Pacific, and in July in the West Indies), the hinder part of the worm, which contains the ovaries and sexual organs, creeps backward out of the burrow, and struggles to get away, while the forward vital part holds on to its burrow. This takes place simultaneously with all the millions of worms in a district. After a little struggle the posterior part breaks away and swims with great rapidity to the surface, vast swarms rushing together to the top, where they are devoured by fishes and birds, and in the South Seas are netted by men, women, and children, by the thousand. Almost at once each worm bursts, discharging the eggs in a shower, and when all are gone the worm ceases its backward flight, collapses and dies. On no other occasion is the worm seen to leave its submarine burrow.

**Palos, pā-lōs'**, Spain, a former important seaport town of Andalusia, in the province and 10 miles southeast of Huelva, on the left bank of the Rio Tinto, near the Gulf of Cadiz, where Columbus fitted out his ships, and whence he sailed on his first voyage for the discovery of the New World in 1492. The convent at the gate of which Columbus appeared as a poor stranger, and asked bread and water for his

child, is still standing here. Palos is now an unimportant village.

**Pal'pi**, the organs or appendages, consisting of stalked or jointed processes, found in connection with the mouth of many invertebrate animals, and which appear to be chiefly devoted to the exercise of the sense of touch, the means by which the animal explores the surface upon which it walks, and probably in some cases of taste also. Thus, in many insects palpi are borne by the "maxillæ" or lesser pair of jaws (*maxillary palpi*), and by the "labium" or lower lip (*labial palpi*). The labial palpi in butterflies form the cushion-like organs by which the elongated proboscis or tongue is protected when at rest; and the small maxillary palpi of these insects are sometimes known as *palpuli*. In bees, etc., the labial palpi are of great relative length. In *Arachnida* (spiders, scorpions, mites, etc.) the maxillary palpi are largely developed. In the spiders these organs in the males are concerned in reproduction, and in the females they are terminated by hooked claws. In the scorpion the same structure forms powerful nipping-claws or *chela*. In the higher crustaceans (lobsters, crabs, etc.) certain of the jaws bear palpi. Consult Packard, 'Zoology' (1897).

**Palpitation**, abnormal movement or beating of the heart, sometimes violent and spasmodic; sensible to the patient, and causing discomfort or even distress. Its immediate cause is an over-stimulation of the excitability of the muscular structures of the heart, due to disturbed action of the ganglia and nerves which control its movements. The predisposing and exciting causes of palpitation are numerous; for example, an excitable temperament; bodily and mental exhaustion; inanition; deterioration of the blood as in scurvy, chlorosis, and spasmæmia; violent exercise or emotion; mental shock; dissipation; dyspepsia. In short, whatever tends to disturb the orderly action of the nervous system may induce palpitation, which is sometimes accompanied by symptoms of choking (*globus hystericus*), vertigo, ringing in the ears, impaired vision, partial unconsciousness, a clammy coldness of the extremities, and the fear of death, due to general nervous agitation. When palpitation arises from actual or organic disease of the heart it is sometimes spoken of as symptomatic; when due merely to disturbed action of the heart or to disorders elsewhere it is frequently called functional, though it is always but a symptom. When occurring with organic disease it often causes more anxiety to the patient than the disease itself. In treatment, remove as far as possible the exciting cause, enjoin absolute rest, keep the feet warm, sometimes give hot drinks—milk, cocoa, and hot water containing a little baking-soda are useful. Valerian and aromatic spirits of ammonia are often valuable. Severe cases should be under the care of a physician.

**Palsy**. See PARALYSIS; PARALYSIS AGITANS.

**Paludamen'tum**, a white cloak, which the commander of the Roman army put on in time of war. Sometimes, however, the color may have been crimson, and in the case of the emperor himself it was purple.

**Paludan-Müller**, pāl'oo-dān-mül'lër, **Fred-erik**, Danish poet: b. Kjørteminde, on the island of Funen, 7 Feb. 1809; d. Copenhagen

29 Dec. 1876. In 1828 he entered the University of Copenhagen, and while a student there attracted attention by his poem 'Raab til Polen' (1831) and a drama 'Kjarlinghed ved Hoffet' (1832). His first poem of note was 'Dandserinden' (1833), followed in 1834 by the lyric drama 'Amor og Psyche' and by two volumes of 'Poesier' (1836-8). His later works include 'Venus' (1841, a dramatic poem); 'Dryadens Bryllup' (1844); 'Tithon' (1844); 'Tre Digte' (1854), among them the lyric drama 'Kalanus'; 'Nye Digte' (1861); and the two prose works, 'Ungdomskilden' (The Fountain of Youth) (1865); and 'Ivar Lykkes Historie' (1866-73), a novel. His chief work is 'Adam Homo,' a poem in *ottava rima*. An edition of his poems in eight volumes appeared in 1878-9.

**Pal'udism** (Lat. *palus*, *palud-*, a marsh), malarial poisoning; disease or disposition arising from malaria (q.v.).

**Pam'ban-manche**, or **Serpent Boat**, the native name for a long canoe used on the Malabar coast. They are from 30 to 60 feet in length, not more than three feet in beam, and are hollowed out of a single tree. The largest are rowed by about 20 men, double-banked, and can attain a speed of 12 miles an hour.

**Pamela**, pā-mē'la, or **Virtue Rewarded**, a novel by Samuel Richardson, published 1741-2. It was the first work of its author who began what is called the modern analytic novel. It won instant applause and a wide circle of readers, all classes of society following with close attention the shifting fortunes of Pamela Andrews, a serving-maid whom the son and heir of the family dishonorably pursues. Richardson created a new era in fiction when he chose a girl of the humble class for heroine, and made use of every-day contemporaneous persons, and scenes for the purposes of the novelist. Thus the story of incident and the analysis of character came into English fiction, and thus the modern novel traces its development from Richardson. It was satirized and parodied in 'Joseph Andrews' by Fielding.

**Pamir** (pā-mēr') **Plateau**, **The**, or **The Pamirs**, Central Asia, an elevated region described as a "huge boss or knot" north of the Hindu-Kush Mountains, connecting the Himalayan and Thian-Shan mountain systems. (See HIMALAYA.) The plateau is about 150 miles long by 150 miles broad, nine tenths of the area being mountainous and the rest pasture-land. The name applied to the valleys is derived from the Persian *pai* and *mir*, signifying "the foot of mountain peaks"; the region is called also by the Persians *Bām-i-dunyā* ("the roof of the world"). The territories belonging to Russia, China, Afghanistan, and Britain meet in the Pamir region, and until the completion of the Anglo-Russian surveys in 1895 demonstrated its strategic valuelessness, owing to climatic and physical conditions, it was a fertile source of political dispute. The plateau has a general elevation of more than 13,000 feet, dominated by still loftier ridges and summits attaining a maximum altitude of 25,800 feet in Mustagh-ata, in the Sarikol range, and covered with perpetual snow. On the plateau are several small lakes, and the sources of the Oxus. From November to April the Pamirs are snow-bound and prac-



## PAMLICO—PAMPANGOS

tically inaccessible, while in the spring and summer the high winds make traveling very unpleasant. The great part of the surface is bare and barren; the native Kirghiz, however, find a certain amount of pasture for their cattle in summer, and in favored localities there is some cultivation. The "roof of the world" is celebrated throughout Central Asia, and notwithstanding its physical drawbacks, two recognized trade routes have traversed it east to west for ages.

**Pamlico**, pām-lē'kō, a river in North Carolina, really an estuary of Tar River, opening into Pamlico Sound. It is 40 miles long, from one to eight miles wide, and navigable for steamers which can enter the sound. Several small streams flow into the Pamlico River.

**Pamlico**, a sound or lagoon on the coast of North Carolina, the largest lagoon on the east coast of the United States. It is about 80 miles long and from 10 to 30 miles wide. It is separated from the Atlantic Ocean by long, narrow, sandy islands,—bars or beaches,—the point farthest out is called Cape Hatteras. Pamlico and Neuse rivers enter the sound, and the outlets on the east are Hatteras and Ocracoke inlets. The northern part is shallow, the southern part is about 20 feet deep. Fish and wild fowl are abundant. Several small islands skirt the shore. Roanoke, in the northern part of the sound, is the largest.

**Pamlico Indians**, a former American tribe living on the Pamlico River in Beaufort County, N. C. They were greatly reduced in number by the smallpox in 1697, and were practically exterminated by the Tuscarora war in 1711.

**Pampa**, pām'pā, or **Bamba**, a Quichua word meaning "plain," applied to various great plains in South America, and also occurring in proper names, for example, Riobamba, Moyobamba, Ayapampa ("Plain of Death"), and Cochabamba ("Lake Plain"). Rarely, as in Peru along the Ucayali River, forested plains are spoken of as pampas; the typical pampas are stretches of treeless plain, varied with rolling prairie, their vegetation being annual or perennial herbaceous plants, with a few shrubs. Water courses are absent, but there are many lakes or pools of rather brackish water. The predominance of grasses, especially varieties of the cereals, make the pampas in general an ideal feeding ground for steers, horses, and sheep. A marked botanical feature of the pampas is a huge thistle apparently indigenous to the Northern hemisphere.

In common usage Pampa or the Pampas is confined to a great plain in Argentina, the administrative district of Pampa Central, with General Acha (1,500 inhabitants) as capital, and a total population of 26,000. Here to a certain degree the original nature of the vegetation has been altered by tree planting, so that much of the plain, which 30 years ago was opened up for cattle grazing by Roca's successful expedition against the Indians of this region, now no longer grows the pasto amargo, but only grasses better suited for sheep. These are tended by Gauchos, Spanish and Indian half-breeds. A few years ago it was estimated that 5,300,000 sheep, 520,000 beef cattle, and 221,000 horses, mules, etc., grazed in this great plain. The Pampas have been scientifically studied by

d'Orbigny, Darwin, and Roth. Beneath a layer of thin vegetable mold, there is 40 or 50 yards of reddish clay, with an admixture of fine sand of chalky infiltrations, apparently proving repeated inundations in geological time. There is a rich prehistoric fauna, notably remains of machærodus, hippidimus, mylodon, megatherium, and mastodons; in the whitish lacustrine deposits near the surface fragments of terra-cotta and primitive tools, as well as bones (some of prehistoric animals), engraved and polished by man. Consult Ameghino, 'La antigüedad del hombre en la Plata' (1880).

**Pampa Aullagas**, owl-yā'gās, or **Poopo**. See AULLAGAS.

**Pampanga**, pām-pān'gā, Philippines, a province of the island of Luzon, situated in the southwestern part of the island, bounded on the north by Tárlac, on the east by Bulacán, on the south by the Bay of Manila, and on the west by Zambales; length 37½ miles from north to south; greatest width 34 miles; area 2,209 square miles. The province is high in the north and mountainous in the northwest and west, but low and marshy in the south; along the shore of Manila Bay and for several miles inland the country is covered by canals and the estuaries of the Grande de la Pampanga River. The principal products are rice (raised in the lowlands of the south), sugar, sweet potatoes, gabe, tobacco, and cotton. Agriculture is the chief occupation of the inhabitants, but mechanical industries are also quite extensively developed; the most important are weaving and the manufacture of sugar, the fisheries of Pampanga are increasing in importance, and there is a large local trade in nipa, sugar, honey, sacks, etc. There are roads connecting all the towns, and connecting the province with Manila, Cavité, Tárlac, and Nueva Ecija; the Manila & Dagupan Railroad crosses the province from southeast to northwest, passing through the larger towns, and has been an important factor in the industrial development of the province. The great majority of the people are Pampangos (q.v.). Civil government was established in the province in February 1901. Pop. 224,000.

**Pampanga**, Rio Grande de la, ré'ō grān'dā dā lā pām-pān'gā, one of the four great rivers of Luzon, Philippines, is formed in the northern part of Nueva Ecija by the junction of a number of streams that drain the western slopes of the Caraballos Sur, flows southwest and south through the provinces of Nueva Ecija and Pampanga, and empties into Manila Bay through a delta of eight mouths. It drains a large territory, and has numerous tributaries, chief among them the Rio Chico de la Pampanga; in the rainy season it overflows its banks in the lower part of its course, and these inundations make fertile soil for the cultivation of rice. It is about 100 miles long, and the means of a large local trade.

**Pampangos**, a group of tribes of the Philippine Islands inhabiting the province of Pampanga, Luzon, and single localities in Nueva Ecija, Bataan and Zambales. They are of the Malay race, and at the time of the Spanish conquest of the islands had a civilization and writing of their own. In Pampanga they use their own language, which is spoken exclusively in that province.

## PAMPAS — PAMPLONA

**Pampas**, pām'paz (Sp. pām'pās). See **PAMPA**.

**Pampas Cat.** See **GRASS-CAT**.

**Pampas Deer**, a small deer (*Cervus campestris*) of the plains of southern South America, having antlers of three points each.

**Pampas Grass**, the most beautiful and the most important commercial ornamental grass (*Gynerium* or *Cortaderia argenteum*). It is a native not of the pampas of South America, but of the well-watered higher lands of Brazil and the Argentine Republic. It grows in large clumps, has leaves often more than six feet long, and flowering stems frequently exceeding 10 feet in height, surmounted by great graceful plumes (panicles) of silvery-white flowers which may occupy even more than two feet of the stem. This beautiful plant is grown in large quantities in California and sold for use in decoration, the plumes often being dyed with aniline in various tints. Outside of California, which is the only country where this grass is grown for market, the plants are cultivated for ornament in parks and gardens, but in the north they need protection with leaves or litter during the winter. They will grow in any good garden soil with no special attention. There are several horticultural varieties whose flowers are pink, carmine, purple, and intermediate tints. Two related species are of some importance: uva grass (*G. saccharoides*), a native of Brazil, furnishes considerable sugar, and *G. jubata*, a plant even more graceful than the pampas grass. Neither is grown in the United States, the former being very tender and the latter little known.

**Pampas del Sacramento**, pām'pās dēl sāk-rā-mēn'tō, Peru, great plain in the north-eastern part of the republic, between the Ucuyali and Aullaga (or Huallaga) rivers. It is crossed by excellent waterways, has a rich vegetation, and was settled in the 18th century by Jesuit missionaries, but is now almost deserted.

**Pampeluna**, pām-pā-loo'nā, or **Pampelune**, pānp-lūn, variant spellings of Pamplona (q.v.).

**Pamphilus**, pām'fī-lūs, Greek painter: b. between 390 and 350 B.C. He and Eupompus were the founders of the Sicyonian school of painting. He was the teacher of Apelles and Melanthus and was famous for scientific accuracy in drawing and perspective. He made his pupils pay him a talent (about \$2,000) for a course in painting. Among his works famous in antiquity were 'The Battle of Phlius'; 'The Voyage of Ulysses'; and 'Family Group.'

**Pamphilus, Saint**, a priest of Cæsarea, by birth a Phœnician, who for refusing to sacrifice to idols was cast into prison. He was a theological teacher at the famous catechetical school at Alexandria and collaborated with Eusebius in writing 'The Apology for Origen.' Persisting in adherence to the Christian faith he was condemned to death (309) and suffered martyrdom by decapitation 16 February, the day on which his festival is celebrated.

**Pamphlet**, a name applied to an ephemeral publication, occasional and not periodical, commonly discussing some question of public or special interest at the time. There are thus two distinct classes of pamphlets, the one addressed

to the general public, and discussing some question of immediate though probably of temporary interest. Political pamphlets form the type of this class. The other is addressed to a special class of readers, and discusses something connected with their particular interests or pursuits. Pamphlets of both classes are now to a great extent superseded by the opportunities of discussion afforded by regular periodical literature. They still, however, serve many important uses. Pamphlets have at various times since the introduction of printing exercised a very important influence, especially in this country, and in general in all times of political and religious excitement pamphleteers have been both numerous and vehement. They have comprised all sorts of men, from scholars and men of genius to the most vulgar and venal of partisans. Consult Waugh, 'The Pamphlet Library' (1898).

**Pamphylia**, pām-fil'ī-a, ancient division of Asia Minor, bounded on the north by Pisidia, on the east by Cilicia, on the south by the Mediterranean (Gulf of Adalia), and on the west by Lycia. Its coast line measured 75 miles, and its extent north and south was about 30 miles. The geological formation is peculiar, the entire surface of the country having been greatly changed since classical times by continuous fluvial deposits of carbonate of lime. The region was never an independent kingdom, so far as we know, but was successively subject to Lydia, Persia, Macedonia, Pergamum, and Rome. The population in early times seems to have consisted of an admixture of Semitic and Indo-Germanic elements. There were Greek settlements at Perge, Aspendus, Side, Cibyra, and Attalia, and remains of Pamphylian inscriptions show that the dialect of Greek used there resembled both Cyprian and Arcadian and hence was a very early form. Consult: Ramsay, 'Historical Geography of Asia Minor' (1890); Radet, 'Les Villes de la Pamphylie' (1890, in 'Revue Archéologique'); and Lanckoronski, 'Städte Pamphyliens und Pisidiens' (1890).

**Pamplona**, pām-plō'nā, **Pampeluna**, or **Pampelune**, Spain, capital city of the province of Navarre, situated near the French border, 200 miles northeast of Madrid, in a plateau 1,400 feet above sea-level, on the right bank of the Arga River and on the railway from San Sebastian to Saragossa. There is an old and a new quarter. The former with its narrow streets has changed little since the city was the capital of the French kingdom of Navarre; but the new part is regularly laid out. The main objects of interest are a cathedral, begun by Charles III. in 1397, the historic hall where the Cortes of Navarre used to meet, the churches of San Nicolas and San Saturnino, and several fine promenades and boulevards, La Taconera being the best; nearby are the gorges of Mayo and Roncevalles. A citadel built by Philip II. has been reinforced by more modern fortifications; the city is an important point strategically. The main industries are the manufacture of leather, linens, paper, flour, soap, strings for musical instruments, and wines. There is a great market at Pamplona from 29 June to 18 July. The city may have been a Roman colony Pompeiopolis; but the derivation is not certain. It was taken from the Arabs by Charlemagne in 778, passed to Ferdinand of Aragon in 1512, was held by the

French during the Peninsular war, and figured in the Carlist insurrections.

**Pamunkey**, pa-mŭnk'ī, a river in Virginia, formed by the junction of the North and South Anna. It joins the Mattaponi at West Point and forms the York River. From the source of the South Anna to the York is 100 miles. The Pamunkey Indians have a reservation on the Pamunkey River.

**Pamunkey**, pa-mŭnk'ī, and **Totopotomoy**, two streams in Virginia, the banks of which were the scenes of military operations during the Civil War. When Gen. Grant withdrew from the North Anna (q.v.) on the night of 26 May 1864, he moved rapidly by the left to cross the Pamunkey, about 33 miles east. Gen. Sheridan, with Torbert's and Gregg's cavalry divisions, preceded the infantry in the afternoon, and at 9 o'clock next morning had crossed the Pamunkey and occupied Hanover Town, near which place, on the Hanover Court House road, one of Gen. W. H. F. Lee's cavalry brigades was met and forced back toward Hanover Court House. On the morning of the 28th Gregg's cavalry division, advancing on the Mechanicsville road, had a severe engagement with the Confederate cavalry near Hawes' Shop (q.v.) and, aided by Custer's brigade, drove it back upon the infantry at the Totopotomoy. Gen. Lee had early information of Grant's movements, and on the 27th put his army in motion to interpose between him and Richmond. Early's corps crossed the South Anna, and by midday of the 28th was in position with its right near Beaver Dam Creek, its left on the Totopotomoy, near Pole Green Church, four miles from Hawes' Shop. Anderson's corps formed on Early's right, and covered the road from White House, on the Pamunkey, by Old Church, Bethesda Church, and Mechanicsville, to Richmond. Hill's corps and Breckinridge's command extended on Early's left to near Atlee's Station, crossing the Virginia Central Railroad a mile north. On the afternoon of the 28th the Sixth and Second Union corps crossed the Pamunkey at Huntley's, four miles above Hanover Town, and took position across the Hanover Court House road at Crump's Creek, and the Fifth corps crossed at Hanover Town, the left near the Totopotomoy, an affluent of the Pamunkey, which it entered two miles below Hanover Town. The Ninth corps crossed at midnight. The Second, Fifth and Sixth corps formed a line in front of Hanover Town, 17 miles from Richmond, the Sixth on the right, the Second in the centre, and Fifth on the left. At noon of the 29th Barlow's division of the Second corps advanced on the road from Hawes' Shop to Atlee's Station, small bodies of Confederate cavalry falling back before it to the other side of the Totopotomoy, where the infantry was found strongly intrenched. Warren's Fifth corps took position on the Shady Grove Church road, skirmishing with the enemy. Wright's Sixth corps moved on the right of the Second, occupying for a time Hanover Court House, and then closing in to the left, and the Ninth corps moved between the Second and Fifth, pushing out on the road to Pole Green Church. There was incessant skirmishing during the 30th in an effort to develop the Confederate position, and late in the day Early's corps attacked Warren's Fifth corps

near Bethesda Church and attempted to turn its left, but was repulsed. To relieve the pressure on Warren, Hancock at 7 p.m. was ordered to attack, and Brooke's brigade carried the first line of rifle-pits occupied by the Confederates. On the 31st Birney's division crossed the Totopotomoy and carried the enemy's advanced line on the right of the Richmond road. Gen. Wilson's cavalry division moved to Hanover Junction and destroyed the railroad bridge over the North Anna, at the same time defeating the Confederate cavalry and driving it from Mechump's Creek; and Sheridan, with two divisions of cavalry, was sent to occupy Cold Harbor, driving the enemy out, and was directed to maintain his position at all hazards. On 1 June Warren moved out to develop the Confederate position, and found it intrenched strongly in his front, beyond clear ground, swept by artillery fire. He lost 200 killed and wounded, extended his line some distance to the left, and was attacked in several places during the day, and quite severely on the right just before dark. Everywhere Gen. Grant had found Gen. Lee confronting him in strong works, and determined again to retire from his direct advance toward Richmond and to throw his troops rapidly to the left to Cold Harbor (q.v.). This movement began on the night of 31 May, the corps moving successively from the right. Consult: 'Official Records,' Vol. XXXVI.; Humphrey, 'The Virginia Campaign of 1864-5'; Wather, 'History of the Second Army Corps'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV. E. A. CARMAN.

**Pan**, in Greek mythology, a rural divinity. Comparative philology, showing that the name is related to *pastor* (Latin, "shepherd"), agrees with the results of modern mythological study which traces his various attributes back to an original god of the flocks, so that we can credit neither the decadent explanation of his name, from the Greek word meaning "all," by his being the son of Penelope and *all* the suitors, nor agree with the Stoics who made of him a god of the universe, the ever-present spirit of nature in *all* things. It seems evident that Pan was originally a shepherd god of Arcady; indeed the figure that Arcady cuts in modern pastoral poetry seems to be due entirely to its mention in classic authors in connection with the pastoral god. Considered as a typical shepherd Pan naturally develops into hunter, fisherman, and, in time, warrior; and "Panic fear" or "panic" is explicable as an extension of the unreasoning terror that seizes a flock of sheep. Another school of mythologists stress the fact that Pan was an Arcadian god, make his various rural activities merely those of the normal Arcadian, and explain his warlike functions by noting that the Arcadians were often mercenaries; but this scheme fails to explain the myth of Pan's love of Selene, the moon-goddess, which is perfectly explicable if we reckon the god a shepherd who must "watch by night." The Arcadian myths of Pan's birth are many, the commonest make him son of Zeus and Callisto, or of Hermes and a daughter of Dryops, and associate him closely with Dionysus. The myth and the cultus of Pan spread slowly through Greece. He was not worshipped at Athens until after the battle of Marathon, where the panic of the Persian army

## PAN-AMERICAN CONFERENCE—PANAMA

was accredited to him; compare Browning's poem 'Pheidippides.' In Rome Pan was identified with Faunus or Inuus and later confused with the Satyrs, so that *Panes* and *Panisci* were spoken of; moreover his nature was sensualized somewhat, so that in early Christian times he became par excellence the god of Greek heathenism. Hence the myth of the death of Pan at Christ's birth; and hence, too, because of the representation in art of Pan as a horned being half-man, half-goat, the popular picture of the devil. Earlier Greek art, it must be remembered, made of him merely a beautiful young shepherd, only occasionally giving him horns, such as were worn by other divinities of nature, notably the river-gods. Consult: Wieseler, 'De Pane' (1875); Roscher, 'Ueber Selene und Verwandtes' (1890).

**Pan-American Conference or Congress**, a title given to the meetings of delegates from various countries of North, Central and South America to consider questions of mutual interest. A desire for the unification of the different American nations was felt as early as 1825, when the Panama Congress, then projected, failed to meet. In 1831, 1838 and 1839-40, Mexico called a meeting, but there was no response. In 1847-48, Bolivia, Chile, Ecuador, New Granada and Peru sent delegates to a meeting, but they adjourned without effective results. Another fruitless meeting was held at Santiago in 1856, Peru, Chile and Ecuador being represented. In 1846, Peru called a conference at which eight republics met to organize a Latin-American Union and "to organize into one family the former Spanish colonies." No report was made of this meeting. In 1878, still another meeting was without results. In 1881 invitations were issued by James G. Blaine, then Secretary of State of the United States, for a Latin-American Congress to be held in Washington the following year, but the project was abandoned. In 1888-89 South American jurists met, but made no political recommendations. Finally, 10 May 1888, President Cleveland was authorized to call an International American Conference to meet in Washington the following year. Delegates were then present from all the governments of South and Central America except Santo Domingo. The object was the furtherance of international comity and commerce, including a customs union, sanitary regulations, intercommunication, uniform weights and measures, a common silver coin and a plan of arbitration. The only practical result was the establishment of the International Bureau of American Republics. On 22 Oct. 1901, delegates from 19 countries were present at a conference in the City of Mexico to consider arbitration, an international court of claims, and the reorganization of the Bureau of American Republics. Many resolutions were adopted, and the congress adjourned to meet at Rio de Janeiro 23 July 1906. Among the subjects considered by this congress was the Drago or Calvo Doctrine forbidding governments to collect private debts by force. The fourth meeting of the conference was held at Buenos Aires, 9 July 1910. At this time the name of the Bureau of American Republics was changed to the Pan-American Union.

**Pan-American Exposition**, a fair held in Buffalo, N. Y., from 1 May to 1 November

1901. Financially it was a failure, due largely to President McKinley's assassination, which caused a temporary closing. The total cost of the exposition was \$8,860,757.20; the total receipts \$5,478,589.37. See EXHIBITION.

**Pan-American Union**. See AMERICAN REPUBLICS, BUREAU OF.

**Pana**, pā'na, Ill., city in Christian County; on the Baltimore & C. S. W., the Cleveland, C. & St. L., and the Illinois Central R.R.'s; about 40 miles southeast of Springfield. It was settled about 1845, and in 1867 was incorporated. It is in an agricultural region in which hay and corn are important products. In the vicinity are coal deposits employing 1,000. There are seven churches, public and parish schools, and a free public library. The general law of 1870, for the government of cities, is in force in Pana. Pop. (1910) 6,055.

**Panætius Rhodius**, Stoic philosopher: b. Rhodes about 180 B.C.; d. Rome about 110 B.C. He spent most of his life in Rome disseminating the tenets of Greek and more especially of Stoic philosophy. Here he enjoyed the friendship of Lælius and the younger Scipio. He subsequently traveled extensively in the East and visited Egypt and on his return opened a Stoic school at Athens. He really belonged to the middle Stoic or Eclectic school and borrowed from Plato and Aristotle. Only fragments of his writings are extant to-day. His chief treatise was one on 'Duty' from which Cicero in his 'De Officiis' has drawn much material. Consult: Van Lynden, 'De Panætio' (1802); Schmekel, 'Die Philosophie der mittlern Stoa' (1892).

**Panama**, pā-nā-mā', republic of Central America, bounded on the north by the Caribbean Sea, on the east by the Gulf of Darien and the Atrato River, which separate it from Colombia, on the south by the Pacific Ocean, notably on the southwest by the indenting Gulf of Mexico, and on the west by Costa Rica, the boundary being unsettled and long in dispute. The interior in general, and especially in the northwest along Mosquito Bay and in the southeast along the Atrato River is marked "unexplored" on the most recent and complete maps of the country. The interior is thick with hills and mountains, a few being extinct volcanoes. These have no connection either with the North American Cordilleras or with the Andes. The only systematic ranges are a bit of the Costa Rica central divide, which runs over into western Panama, and on the Atlantic coast further east the Cordillera de San Blas. The detached and irregular hills are often separated by streams greatly subdivided. The banks of these streams, and, indeed, the greater part of the country is covered with dense tropical vegetation. The exceptions to this rule are a few treeless uplands along the Pacific side between the Costa Rica border and the Gulf of Panama. The streams are unimportant with the exception of the ill-named Rio Grande, emptying into the Pacific near the city of Panama, and the Rio Chagres which flows into Limon Bay near Colon. The importance of these two rivers lies largely in their proximity to the projected canal. This lack of interior waterways and the general impassability of the country make the only outlet for most towns the sea and make other

## PANAMA

means of communication (save between Colon and the city of Panama by rail), as well as other location than near the sea, practically impossible. The altitude of the country varies between 200 and 1,500 metres. The climate is warm and damp, and extremely unhealthy. The terrible mortality consequent upon the canal excavations made by the French are so commonly taken to prove that the earth if merely upturned breeds a deathly miasma, the "creeping Johnny," that the natives neither hoe nor plow in their small agriculture. But the high death rate is quite as probably explicable by the lack of sanitation and by the unrestrained use of mountain streams for laundries, drains, cess-pools, and drinking water reservoirs.

*History.*—Columbus landed on the isthmus in 1502. Then came further exploration, notably by Balboa, and in train of that colonization, still in the first quarter of the 16th century. In the more flourishing days of Spanish rule in that century and the next the country in general and the city of Panama (q.v.) in particular enjoyed the advantages coming from the shipment of South American silver and gold. But this prosperity had so drooped at the close of the 18th century that Panama was largely isolated from Colombia and took comparatively little part in the various revolts that culminated in Colombian independence in 1819. Two years after that date, however, the people of Panama proclaimed their independence and became part of the republic of Colombia. This was a strongly centralized government held together by little but Bolivar's personal influence and power. It was shattered in 1831, the year after his death, and three new republics were formed, namely, Venezuela, Ecuador, and New Granada. The last named included the Isthmus. Strangely enough the form of government of the new republic was practically identical with that which had brought it to revolt against Colombia; and in the new republic of New Granada the centralized government was equally ill-adapted to its heterogeneous elements. Moreover there was no simple and speedy means of intercommunication such as might have welded the country into some national unity. In the existence of this type of government is the philosophic key to the history of both the old republic of Colombia down to 1831, and after that date of New Granada and the New United States of Colombia. It was in the very nature of things that as New Granada had broken from Colombia, so Panama, New Granada's remotest part, must break, or attempt to break from New Granada. A state's rights or Federalist party did rapidly rise throughout New Granada. In 1840 revolutions broke out in most of the provinces. An independent "State of the Isthmus," containing the provinces of Panama and Veragua, was proclaimed in 1841, but the Centralists were successful, the revolution was suppressed, and the old régime was restored. The sentiment against this method of government steadily increased until in 1855 by an act of the Congress of New Granada at Bogota the autonomous state of Panama was erected out of the Isthmian provinces. But the sincerity of this act may well be questioned and its aim was probably political and the purpose to crush the Federalist party for good and all. But the attempt of the national government to revoke its act, and, it seems, to provoke a revolution, and then in crushing that

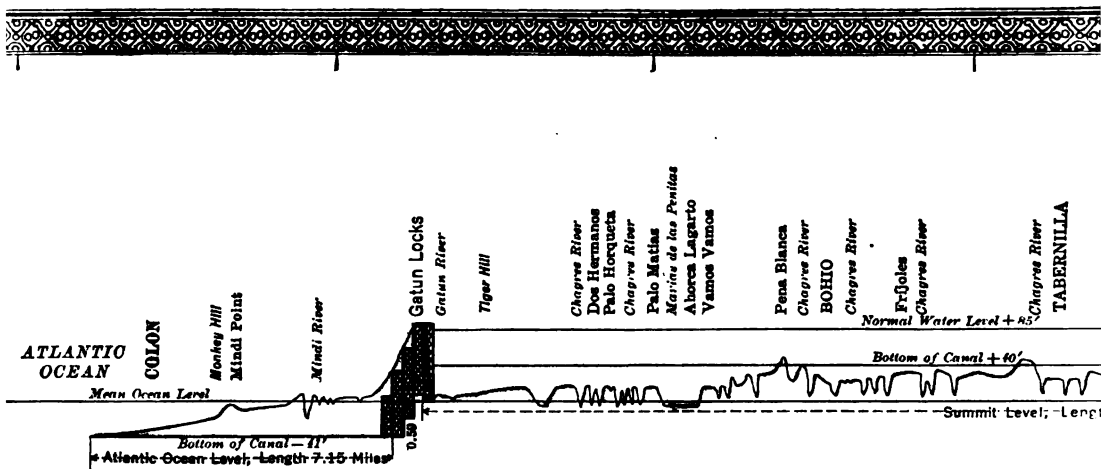
revolution to put a stop to all Federal agitation, overreached itself. The revolution in behalf of the new constitution was completely successful. For a score of years and more Panama, like the other states in the Colombian Union, enjoyed (more or less interruptedly) its individual rights. A Centralist uprising in 1885, however, effected a return to old conditions. The former state of Panama was again ruled from Bogota, and became a department called Panama. This department was divided into four provinces, Chiriqui, Veraguas, Azuero, and Panama; the last named province occupied the eastern half, approximately of the department of the same name, with which it is very easily confused.

It is worth noticing in passing that during this revolution in 1885 the United States of North America landed marines to protect the transit of the Isthmus between the cities of Colon and Panama, a circumstance of material assistance to the Centralist insurgents, but an act undertaken simply for the sake of inter-oceanic and trans-Isthmian commerce. That it could have been for any reason other than this is impossible, since the right and duty of the United States to preserve neutrality in the Isthmian strip was due to a treaty made in 1846 with the government of New Granada, a government not in existence in 1885. In short the obligation was one to a territory and not to any power; and if to any power simply to that in control of the Isthmus, no matter what its relation to the original treaty-making power.

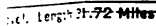
Since 1885 the relations of Panama with Colombia have been no closer nor more familiar than before. Several revolts have taken place, and in July 1900 under the lead of Porras, later a leading candidate for the vice-presidency of the republic, a desperate but unsuccessful attempt was made by a Liberal army to get control of the city of Panama. In 1903 a more successful plot was planned, growing out of the discontent of the people of Panama with the attitude of Colombia toward the Panama Canal Treaty with the United States. Whether through fear that the United States would in time gain sovereignty over the canal—there was an old saying that the canal when built would become the southern boundary of the United States—or a hope that the bid for the canal might be largely increased, the Colombian Congress refused to ratify this treaty and adjourned 31 Oct. 1903. By the terms of the Spooner Bill this made the Panama Canal apparently an impossibility and the Nicaragua Canal a certainty, for the President had been bidden to treat for the Panama Canal, and if such negotiations failed to carry through the project of the Nicaragua Canal. In short, the people of Panama would have been deprived of the fulfilment of their hopes of renewed commercial importance by this inexplicable action of the Colombian Congress, had not the revolution planned as early as the summer of 1903 offered a solution. How the desire for autonomy, the desire for a canal, and the desire for the money to be paid for the canal, respectively, bulked in the minds of the revolutionary plotters it is impossible to say. The foregoing sketch of Panama's political history would show at least that a revolution for purely political reasons was a possibility. The mixture of motives amounts to little more than a coincidence of several impulses, each of which alone would







**HORIZONTAL SCALE OF MILES**





have been sufficient. On 3 Nov. 1903—that is three days after the adjournment of the Colombian Congress—the municipal council of the city of Panama proclaimed the independent republic of Panama. There was no bloodshed. An army of 400 Colombians (mostly boys between 12 and 14) arrived 4 November in Colon, whence its general with his staff went to Panama, was dined there, and upon his refusal to acknowledge the new republic, of which he knew nothing until the evening of the 4th, was imprisoned for a few days, but on the 7th with his army was shipped back to Cartagena from Colon. In the meantime upon the 6th of November the United States government recognized the new republic, being satisfied that there was not the slightest internal opposition to its establishment. France's recognition followed 10 November, and soon afterward like action was taken by Germany, England, and Russia. The remarkable haste with which the provisional government was recognized by our own is not without precedent; in a Senate debate 5 Jan. 1904, Senator Lodge pointed out that in 1848 the French republic was recognized after three days and that the Republic of Brazil had received formal recognition within two days after its formation. It is to be noticed also that Panama's government may perfectly justly be reckoned a "resumption" of previous independence. As to the action of our government in landing marines to protect the trans-isthmian railroad, its defense lies in an appeal to the Treaty of 1846, to the precedent of 1885, when the Centralist cause was as much (and as unintentionally) aided as it was checked in 1903, and to the principle that it is the Isthmian commerce that we aim to protect by keeping the strip neutral rather than any government, and hence that an appeal from any established power in the Isthmus for protection of the railroad must be met by speedy and unhesitating action. The objections to this view of the case and the disagreement with the actions of the existing administration came from various sources; first, as in the case of the New Haven petition sent to the Senate 11 Jan. 1904, from unpartisan constitutional experts; and second from the opposition in Congress and the supporters of the Nicaragua route, who saw their last chance to win. The New Haven petitioners simply asked the Senate to make a careful and deliberate investigation. The opposition in Congress (and in the press) urged that the revolution in Panama was fostered if not actually started by the Republican administration and the landing of troops was for the purpose of preventing Colombia from subjugating the rebellious department; in fine, that both revolution and recognition grew out of pure self-interest in the proposed canal. Whatever the merits of these arguments, the inability of the Democratic caucus to bind its members to oppose the Canal Treaty, the instructions from the Mississippi Legislature to the Senators from that State, and 11 Jan. 1904 the practical confirmation of the nomination of W. I. Buchanan to be minister to Panama by the tabling Senator Morgan's motion to reconsider, seemed to show that the actual opposition was political and temporary.

The provisional government founded 3 November was in the hands of a junta consisting

of J. A. Arango, Tomas Arias, and Federico Boyd. The last-named member of the junta arrived in the United States on 18 December and late the same day a Canal Treaty was signed by Secretary of State John Hay and the minister from Panama to the United States, Philippe Bunau-Varilla (see VARILLA, PHILIPPE BUNAU), who had been formally received at Washington eight days before. This treaty is practically the same as the convention made with Colombia; the compensation is the same; but the canal strip is made wider and the powers granted to the United States are larger. The junta named above took control of the government, being assisted by the following provisional cabinet: Minister of Government, Eusebio Morales; Minister of Finance, Dr. Manuel Amador Guerrero (later elected president); Minister of Foreign Affairs, F. V. de la Esprilla; Minister of Justice, Carlos Mendoza; Minister of Public Instruction, N. Victoria; and Minister of War and Marine, M. de Obarrio, Jr. On 27 December a general election of delegates to a national convention took place. In most instances municipal authorities acted as electors; the scheme of manhood suffrage originally promulgated having proved impracticable. Four delegates were chosen from each province except Panama, which elected eight, making a total of 32. These delegates, meeting 15 Jan. 1904, were called to frame a constitution and to elect a president. The provisional government ratified the Canal Treaty 2 Dec. 1903, and five days afterward the treaty was submitted to the United States Senate for ratification by that body. On 16 Feb. 1904, Guerrero was elected president, with Arasemena, Obaldia, and Mendoza as *designados*, or vice-presidents.

Article 2 of the treaty between the United States and the republic of Panama, which was ratified by the United States Senate 23 Feb. 1904, and went into effect 26 Feb. 1904, provided for the cession, in perpetuity, by Panama, of a strip of territory adjacent to the canal, as follows:

"The Republic of Panama grants to the United States in perpetuity the use, occupation, and control of the zone of land and land under water for the construction, maintenance, operation, sanitation, and protection of said canal of the width of ten miles, extending to the distance of five miles on each side of the centre line of the route of the canal to be constructed; the said zone beginning in the Caribbean Sea, three marine miles from mean low-water mark, and extending to and across the Isthmus of Panama into the Pacific Ocean to a distance of three marine miles from mean low-water mark, with the proviso that the cities of Panama and Colon and the harbors adjacent to said cities, which are included within the boundaries of the zone above described, shall not be included within this grant. The Republic of Panama further grants to the United States in perpetuity the use, occupation, and control of any other lands and waters outside of the zone above described which may be necessary and convenient for the construction, maintenance, operation, sanitation, and protection of the said canal or of any auxiliary canals or other work necessary and convenient for the construction, maintenance, operation, sanitation, and protection of the said enterprise. The Republic of Panama further grants to the United States in perpetuity the use, occupation, and control of all islands within the limits of the zone above described, and in addition thereto the group of small islands in the Bay of Panama named Perico, Nacs, Culebra, and Flamingo."

In compensation the United States paid \$10,000,000 for the concessions and agrees to pay

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\$250,000 annually beginning in the tenth year after the ratification of the treaty.

The uneasy conditions prevailing throughout the Central American countries during 1907 and the early part of 1908 were particularly manifest in Panama, especially as the time for the election of a new president drew near. This uneasiness caused some apprehension at Washington lest the canal zone become affected in some way. Charges had been made by one of the political parties that frauds had been perpetrated in the previous elections and that the members of the opposition party had not been allowed to register. A request was therefore sent in May, 1908, to the United States to appoint a commission to assure a fair election. In order to pacify all the political elements Secretary of War Taft was sent to Panama.

Ricardo Arias, Secretary of Foreign Relations, was the candidate of the government party for the presidency and José Obaldia was the candidate of the Liberal party in opposition to the government. The latter, while popular with the people, was not so with the government, and Arias planned to use the power of the government and police forces to hold a dummy election and declare himself elected.

Upon his arrival Taft decided to appoint American representatives to observe the elections which were to be held on 12 July, and made it plain to the political parties that if frauds were permitted that might lead to disorder, riot, or insurrection, the United States would preserve order according to the terms of the treaty. A commission of electoral inquiry was appointed by Panama to investigate and a list of the actual voters in each polling precinct was made. Thereupon Arias withdrew from the contest and Obaldia was elected almost without opposition, as the supporters of Arias refrained from voting. The election was quiet and orderly.

By the provisions of the constitution as adopted, the country has a centralized republican form of government which covers all parts of the isthmus except the canal zone. The executive authority is vested in a president elected for a term of four years by popular vote; the president is assisted by a cabinet of four members. The legislative branch of the government consists of a single body of deputies called the National Assembly and the members are elected for four years. The sessions of this Assembly vested in a supreme court, a circuit court, and the usual inferior courts. For local government the republic is divided into seven provinces, each of which in turn is divided into municipal districts. The affairs of the provinces are administered by governors, and those of the municipal districts by mayors and municipal councils, elected by popular vote. The financial condition of the country is excellent, there being no national debt and a surplus of \$8,000,000 in gold in the treasury.

**Area and Population.**—The extreme length of Panama is about 480 miles, the width varying according to place from 35 to 110 miles. The total area is about 31,500 square miles.

The republic has a population of about 340,000 of the most heterogeneous sort. There are a few natives of Europe and of the United States,

mostly engaged in the operation of the Panama Railroad; many people of Spanish and Indian descent; and especially on the Atlantic coast a number of English-speaking negroes and mulattoes.

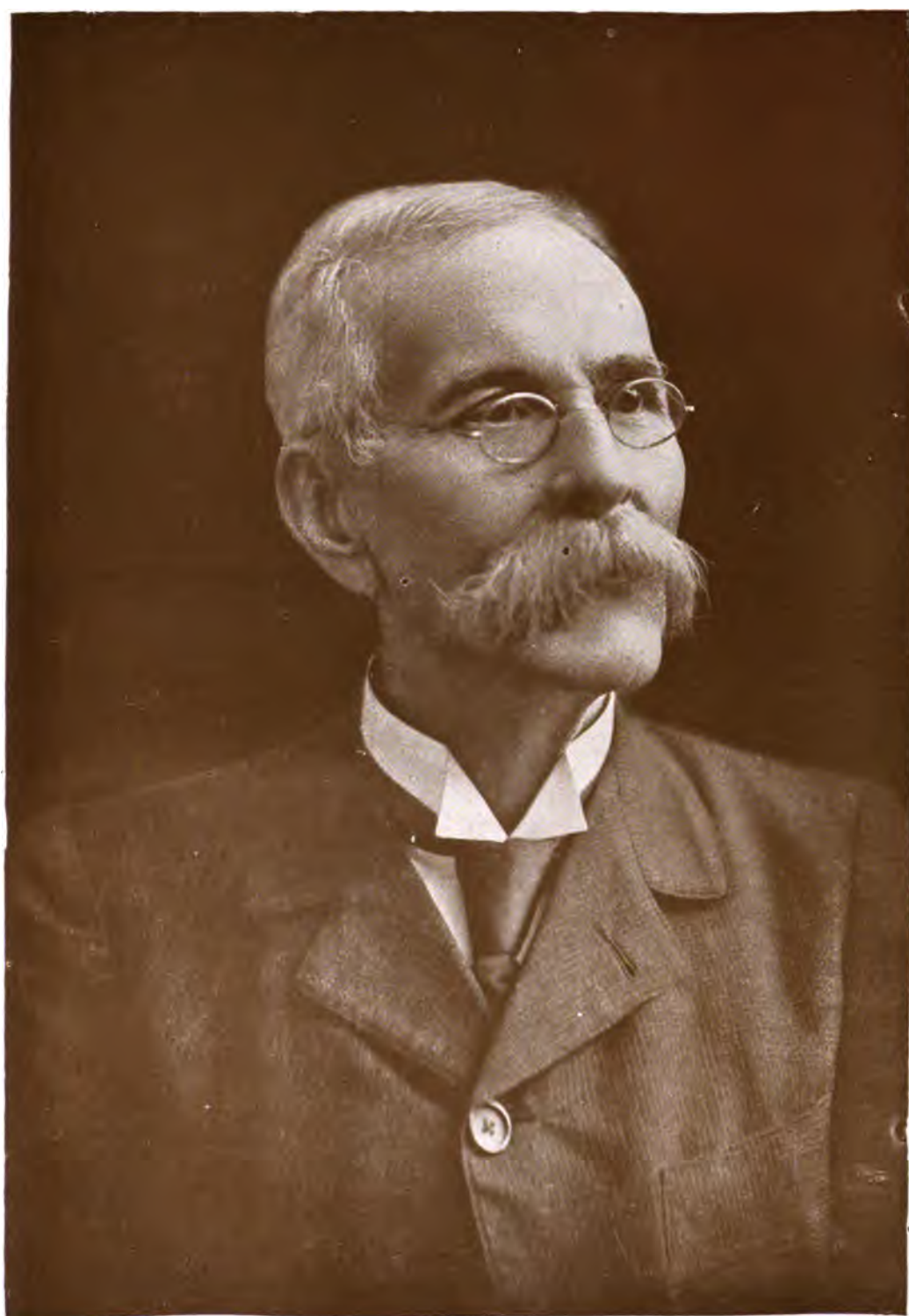
**Products.**—Though the climate is favorable to agriculture and the soil exceedingly fertile, less than one-third of the country is occupied, and of the occupied territory only a small portion is systematically developed. The most important product of the country is the banana; cereals, tobacco, and coffee are also grown. Cotton and indigo and tropical nuts and spices grow wild and are also cultivated. Rubber is also collected in the mountains and there are extensive forests of valuable timber. Stock-raising is not carried on to a great extent.

Lack of development is also manifest in relation to the mineral resources, which are not sufficiently worked to become a source of revenue to the country. Gold, copper, coal, iron, salt, and mineral waters are among the minerals found in different parts of the country.

**Transportation and Commerce.**—The only railroad on the isthmus and the only means of transportation for passengers and freight between the coasts is the Panama Railroad, owned and operated by the United States. This road is 47½ miles in length and connects the cities of Panama and Colon. The country practically has no highways of any value, crude roads and trails in the vicinity of the large towns being the nearest approach to highways; the interior of the country is almost unfit for travel.

The chief commercial cities are Colon (or Aspinwall), with a population of between 3,000 and 4,000, and Panama (q.v.), the termini of the railroad and canal. The commerce of the republic is chiefly with the United States but there is also considerable trade with France, England, and Germany. For the year ending 30 June 1908, the exports to the United States were valued at \$1,469,344, and the imports from the United States at \$18,232,666.

**Panama**, city of Central America, capital of the republic of Panama, situated on a coral peninsula running into the Gulf of Panama. It has no actual port, but vessels anchor safely between the mainland and a chain of islands. Founded near the Pacific coast in 1518 by Pedro Arias Davila, Panama became wealthy in the days of the Peruvian mines, and was the oldest and richest colony in America in 1671 when it was taken, looted, and burned by the buccaneer, Sir Henry Morgan (q.v.). The present city, six miles from the site of the old, was built two years after, and with its granite fortifications, now in ruins, was long the strongest Spanish fortress on the Pacific. The rush of gold-hunters to California in 1849 renewed its prosperity somewhat and in 1855 procured for it railroad connections with Colon, a new port on the Atlantic; nearly 100,000 passengers and 1,000,000 tons of freight landed by about 1,000 steamships are annually carried by this road. Besides this mere reshipping business it has the large part of the export trade of what is now the republic (and was the department) of Panama. The exports consist chiefly of india rubber, hides, cocobolo nuts, ivory nuts, deer-skins, and coffee. The city is the seat of a

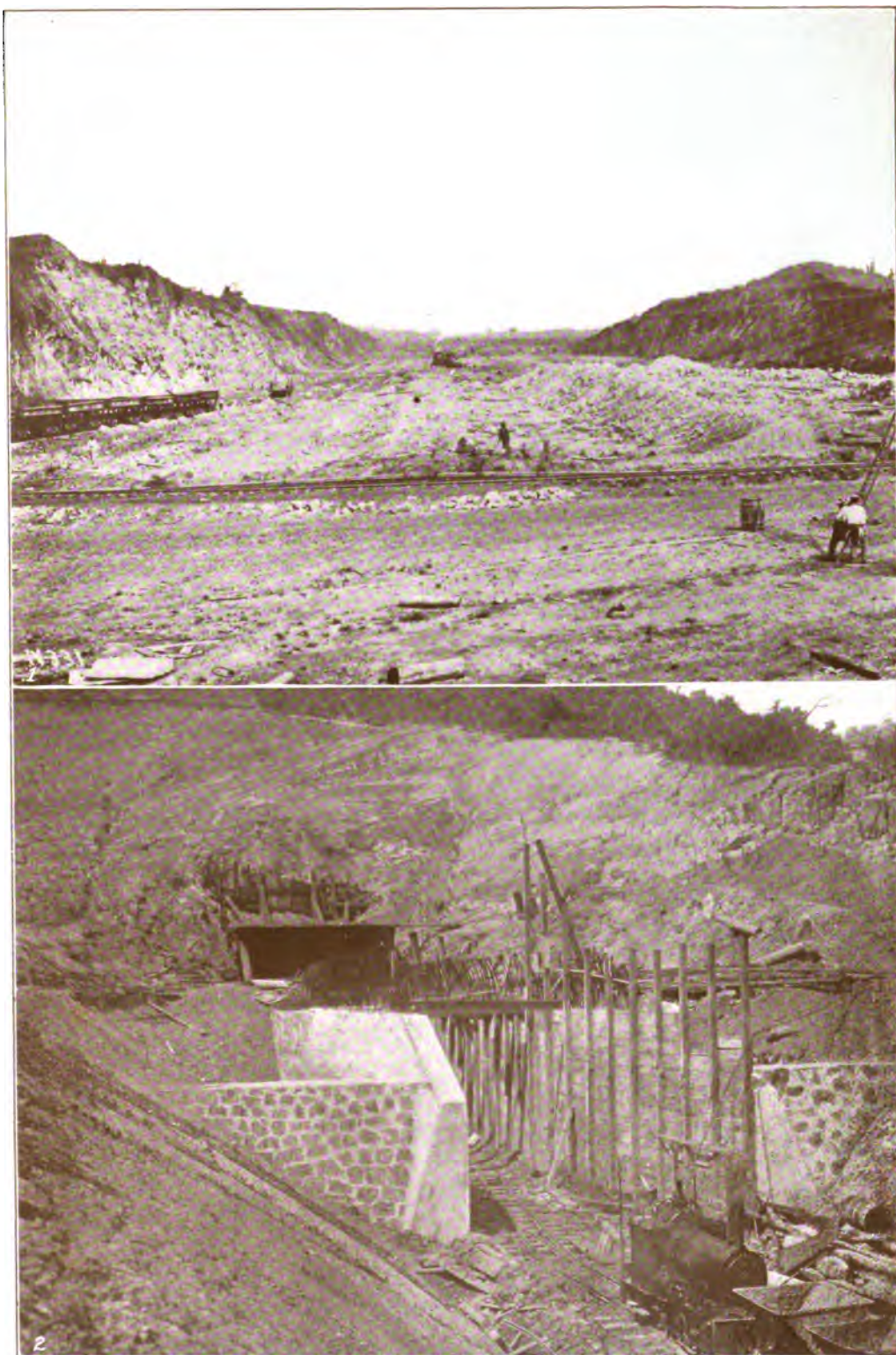


DR. MANUEL AMADOR,  
FIRST PRESIDENT OF THE REPUBLIC OF PANAMA.





# PANAMA CANAL.



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1. Gatun Lock looking North.
2. South end of the Miraflores Tunnel.



bishop and of several consulates, and has a cathedral, ruined convents, a Jesuit college and a university founded in 1751. Panama is the centre of the country; in it the revolution against Colombia was carried out 3 Nov. 1903. Pop. about 30,000.

**Panama, Isthmus of**, the tongue of land connecting the northern and southern American continents and varying in width from 30 to 70 miles. The isthmus runs east and west with a double curve in either coast line, so that the western hollow made by Mosquito Bay on the north side and the eastern indentation of the Gulf of Panama on the south side, each with a corresponding bulge opposite, give the entire isthmus the shape of a recumbent S or of the sign of variation. In this more extended use of the term the words Isthmus of Panama are applied to the entire republic of Panama (q.v.), that is, what was formerly the department of Panama. The term is also used of the eastern and narrower part, corresponding roughly with the former province of Panama; to this part the name of Darien was originally applied. The isthmus was reached by Columbus in 1502, and was an immediate field for Spanish civilization. It was crossed in 1513 by Balboa, who "from a peak in Darien" discovered the Pacific. The cities of Panama and Nata were colonized before 1520. The isthmus was also the scene of the Darien scheme of colonization fathered by William Paterson (q.v.). In spite of its having been known so long to European explorers, large parts of the Isthmus to the west of Colon are unexplored.

**Panama Canal.** See ISTHMIAN CANALS.

**Panama Congress**, a congress of representatives of various American nations held at Panama June 1826, for the discussion of matters of interest to the American peoples. The meeting was originally intended only for South and Central American delegates, but the ministers of Mexico, Colombia, and Guatemala at Washington formally invited the United States to be represented. After some friction in Congress two delegates were appointed, but at the congress 22 June 1826 the American delegates were not present, one having died en route and the other having been delayed in transit. Chile and Brazil approved of the congress but did not send delegates. The congress held to sessions, and among other results agreed to a perpetual union for defense against Spain.

**Panama Hats.** See HATS AND HAT MAKING.

**Panas, Photinos**, French surgeon and ophthalmologist: b. in Cephatonia, one of the Ionian Islands, 30 Jan. 1832; d. 1903. After an elementary course in medicine at Corfu, he went to Paris where in 1860 he was graduated from the School of Medicine. Three years later he became a naturalized citizen of France and was then appointed associate professor and surgeon to the Central Bureau. In 1864 he became ophthalmic surgeon to the Bicêtre hospital, in 1865 to the Midi and Lourcine hospitals, in 1868 to the Saint Louis and Saint Antoine hospitals, in 1872 to the Lariboisière hospital, and in 1877 to the Hôtel Dieu. In 1879 he was appointed professor of clinical ophthalmology in the Ecole de Médecine. Panas rendered valuable service in the Franco-Prus-

sian war and achieved some renown through his introduction into France of Lister's methods and by his operations in ovariectomy. He was more widely known, however, for his writings in medical journals subjects connected with his specialty, and for his works on ophthalmology, the most important of which are: 'Leçons sur le strabisme, les paralysies oculaires,' etc. (Paris 1873-93); 'Leçons sur les kératites' (1876); 'Leçons sur les affections de l'appareil lacrymal' (1877); 'Leçons sur les rétinites' (1878); 'Anatomie pathologique de l'œil', with Remy (1879); 'Sur le glaucome et les néoplasmes intraoculaires' (1893); 'Traité complet des maladies des yeux' (1894); 'Leçons de clinique ophthalmologique' (1899); etc.

**Panathenæ'a**, Greek festivals, celebrated at Athens in honor of Athena. The Panathenæa were distinguished into the greater and the less, in both of which three kinds of games were exhibited, conducted by 10 presidents. On the first day were races with torches in the Ceramicus; on the second, gymnastic exercises, and imitations of naval fights; on the third, contests of music and declamation, and dramatic representations. An olive crown from the groves of Academus and a vessel full of sacred oil were the rewards of the victor. Then followed the sacrifices and the sacrificial feasts.

**Panay**, pā-nī, Philippines, the most north-western island of the Visayan group, lying a little to the southeast of the centre of the archipelago, bounded on the east by Iloilo Strait, and on the west by Mindoro Sea; area 4,752 square miles, with dependent islands 5,103 square miles. The largest of the dependent islands is Guimaras (243 square miles), lying to the southeast of Panay.

**Topography.**—The shape of the island is roughly triangular. A mountain range extends from the peninsula of Buruanga in the north-west to the extreme south, and from Maymagui Mountain, in the centre of this range, another mountain system extends to the east and north. The island is thus naturally divided into three provinces. There are three large rivers, the Panay, Jalaur, and Aclán, and numerous smaller streams. The coast on the east and north is well indented with bays and harbors.

**Industrial Resources.**—The chief industry of Panay is agriculture; cotton, corn, chocolate, pepper, coffee, tobacco, sugar, rice, and copra are raised; the last three are the staple crops, and of excellent quality. The maximum shipment of sugar was in 1892, amounting to 177,467 tons; in 1899, during the insurrection, the amount of sugar shipped was 77,641 tons, and of copra 636 tons. There are also large numbers of live stock raised, cattle, carabaos, and horses, excellent grazing lands being found in all parts of the island. The horses raised in the province of Iloilo are very highly prized throughout the archipelago. The forests are valuable; among the more important woods are molane, ebony, and sibucao, large quantities of which are exported; honey, wax, and pitch are also gathered in considerable quantities. The mineral resources have not been scientifically developed; gold is found and is mined in small quantities; and fine marbles and tonalite are quarried to

some extent; there are deposits of gypsum, marl, and iron; quicksilver and copper are also reported. The mechanical industries are well advanced and produce for export; fine fabrics of pineapple fibre, *jusi*, *sinamay*, and cotton are manufactured; also sugar sacks, hats, and palm-leaf baskets; the woven fabrics of the province of Antique are especially well known, the looms giving employment to over 12,000 women; lime of good quality is manufactured in Iloilo. The fisheries are also valuable, particularly those of the island of Guimaras. Within the three provinces there are excellent road systems; but as the mountains are almost impassable the trade between provinces is entirely by sea; there is also a large foreign trade, the town of Iloilo being next to Manila in commercial importance.

*People and History.*—The people of Panay are almost entirely of Visayan race; a few thousand wild *Mundos* and a few *Negritos* live in the mountains. This island was a stronghold of the Filipino insurrection; it was first occupied by United States troops in the early part of 1899, when a base of operations was established at Iloilo; the enemy's force in that province was dispersed and order established. Cápiz was occupied in the same year, and San José de Buenavista, the capital of Antique, was taken in 1900; but the American advance was vigorously resisted, and the island was not completely pacified until January 1901. Civil government was established under military control, and public schools put in operation as soon as possible, until the permanent government was organized under the provincial government act of the Philippine Commission in April 1901. The island was divided into three provinces (in accordance with the natural divisions), Antique, Cápiz, and Iloilo; the former Spanish commandancia of Concepcion was consolidated with Iloilo. Pop. 801,900.

**Panay**, Philippines, a pueblo of the province of Cápiz, island of Panay, situated a few miles inland from the northern coast, three miles southeast of Cápiz, the provincial capital. Pop. 15,500.

**Panay River**, a river of the province of Cápiz, island of Panay; rises on the eastern slopes of the Tapas Mountains, flows north, and empties into the sea near the town of Cápiz; length, 38 miles. It is one of the most important rivers of the island of Panay, has five chief tributaries, and drains the greater portion of the province of Cápiz. It has a high-tide depth of 13 feet at its mouth, and is navigable for large native craft for a considerable distance.

**Panchatantra**, *pān-cha-tān'tra*, an old collection of apologues and stories in Sanskrit. Vishnuserman is represented as the narrator of the stories and author of the book. The Panchatantra has been frequently revised. Wilson had three widely varying manuscripts before him while he drew up his analysis of the work. Kosegarten, who first edited the Sanskrit text, used 11 varying manuscripts. In these he recognized two versions, one simple, the other more extended and elaborated. Neither of these can be the first form of the work, which must have been a still more ancient text.

Some of the apologues contained in the Panchatantra occur in the Mahabharata, others originate in Buddhist books, and several abridgments or imitations occur elsewhere in the Sanskrit.

The 'Panchatantra' is one of the works styled in India as 'Nitisāstras' (*śāstra*, "book of knowledge," and *niti*, "conduct"), written for the instruction of kings and all those called to take a share in the government. The five books of which it is made up form as many distinct sections related to each other by a preface in which a king, after taking the advice of his councillors, entrusts to a Brahman the training of his three sons. The Brahman composes the Panchatantra for the edification of the young princes, and by the reading of that work he succeeds in overcoming their idleness and in developing their minds.

The first book has for its title 'Mitrabhedha' ('The Disunion of Friends'). It aims at acquainting kings with the danger incurred by lending ear to the insinuations of those who seek to sow divisions between a prince and his faithful subjects. The second book 'Mitraprapti' ('The Acquisition of Friends') shows how advantageous it is for men to unite and help each other. The third book, 'Kakolukiya' ('The War of the Crows and the Owls') demonstrates the danger of trusting to untried men or to enemies. The fourth, 'Labdhapranasana' ('The Loss of Acquired Good') proves that we frequently lose by imprudence what we had acquired with difficulty. The fifth and last book, 'Aparikshitakarakā' ('Inconsiderate Conduct'), shows the danger of being precipitate. The narrative is interspersed with sentences, maxims, thoughts, extracts from legal codes, poems, and dramas.

Consult: Kosegarten, 'Panchatantrum' (1848-59); Lancereau, 'Panchatantra,' French version (1871); Schmidt, 'Panchatantra, Textus Ornatior,' German version (1901).

**Pan'coast**, **Henry Spackman**, American educator: b. Germantown, Pa., 24 Aug. 1858. He was educated at the Germantown Academy, studied law, and was admitted to the bar in 1882, but retired from practice in 1887 to devote himself to teaching. He has published 'Representative English Literature' (1892); 'Introduction to English Literature' (1895); 'Introduction to American Literature' (1898).

**Pan'cras**, **Saint**, or **Pancratius** ("Victor in every game") a Christian martyr, who at the age of 14 defied the decree against Christianity issued by Diocletian and was accordingly put to death (304). There are many churches dedicated to him in England, Italy, France, and Spain, and his festival is celebrated on the anniversary of his death (12 May).

**Pan'creas**, a lobulated racemose gland situated behind the stomach, lying in a nearly straight manner across the spinal column, at the level of the first lumbar vertebra or that of the loins. The head and broader portion or right extremity lies with a loop or curve formed by the duodenum or first portion of the intestinal tract (see *INTESTINE*); while the tail or narrower part or left extremity, is in apposition with the spleen. In man the pancreas is about eight inches long, in thickness it may vary from a half inch to an inch or more; its average breadth being about 1½ inch. Its weight is usually three ounces or over. The splenic vein and splenic artery pass along its upper border, while the lower border rests upon the transverse portion of the duodenum. Behind, the pancreas is in contact with the vena cava inferior, with the

## PANCREATIN — PANDECTS

kidney of the left side and its supra-renal capsule, and with the portal vein at its commencement. The duct or excretory tube of the pancreas passes from the right to the left of the structure in the front, and at the lower or inferior edge of the gland.

The diseases of the pancreas are few, and do not betray their presence by any very marked symptoms. The most common form of disease is cancerous deposit in the head of the gland, which frequently induces jaundice by obstructing the common biliary duct near its opening. An accurate diagnosis of disease of this organ is extremely difficult, and cannot lead to efficient treatment; all that can be done in these cases being to palliate the most distressing symptoms. The pancreas of ruminating animals is a favorite article of food under the name of sweetbread. See ANATOMY, COMPARATIVE; DIGESTION.

In bears, dogs, and many other *Mammalia* the pancreas exhibits a structure more complicated than that found in man. In rodents, in the hedgehog and flying fox, etc., it exhibits a branched or arborescent structure. In the horse and pig it is trilobular. In the ox it is invariably and in man sometimes double. In birds the sweetbread is narrow and elongated, lies within the duodenal loop, and possess usually two ducts. The pancreas of reptiles and amphibia presents no features worthy of special remark. In certain fishes a pancreas exists, but its place in the generality of fishes appears to be filled by a greater or less number of cæcal appendages (the pyloric cæca), which are attached to the pyloric or hinder aspects of the stomach. In the sword-fish these cæca become aggregated together so as to form a pancreatic-like structure. In the lancelet no pancreas or homologous organ exists. In *Invertebrata* certain organs connected with the digestive system have had a pancreatic function assigned them. In gasteropodous mollusks it makes its first definite structural appearance as a long glandular sac.

**Pancreatin**, a substance secreted by the pancreas, and often administered, in medicine, for the correction of certain digestive disorders. The commercial supply that is used in medicine is mostly obtained from the pancreas of the hog, and is best known in the form of a grayish, amorphous powder, usually with a tinge of yellow, and with a faint, characteristic smell. Pancreatin is not a definite chemical substance, but contains several distinct ferments. Its composition varies, moreover, with the source from which the substance is prepared, and with the state of activity of the particular pancreas from which it is extracted. One of its normal components, steapsin, is an exceedingly powerful agent for effecting the emulsification of fats, and it is even able to partially separate them into free glycerin and free fatty acids. Another constituent, trypsin, converts coagulated albuminous substances into soluble peptones, resembling pepsin in this respect, although its action is somewhat different. Pancreatin, for example, is effective only in an alkaline medium, while in the case of pepsin the medium must be acid. Another constituent, amylopsin, converts starches and other amylaceous substances into sugars; and a fourth ferment that is present possesses the power of coagulating the casein of milk.

**Pan'da**, or **Wah**, an animal (*Ælurus fulgens*) of the raccoon family, which inhabits the

eastern Himalayas to a height of about 12,000 feet. It is equal in size to a large cat, and has remarkably glossy reddish-chestnut fur, darker below, with a white face and a long ringed tail. It seems to be the remnant of a once very widespread group which in the early Tertiary Period was numerous in Europe, explaining the present curious distribution of the family, for all other existing raccoons are American. The animal is described as inhabiting forests and feeding almost entirely on vegetable food; but it eats eggs and insects when it can get them. Most of its time is spent upon the ground, but it has semi-retractile claws and is able to climb trees. It is said to be rather a dull-witted, defenseless creature, reminding one of the kinkajou. Consult: Flower and Lydekker, '*Mammalia*' (1891); Blanford, '*Fauna of British India: Mammals*' (1888).

**Pandan**, pân-dân', Philippines, a pueblo of the province of Antique, island of Panay; on the west coast near the Bugang River; 66 miles north of San José de Buena Vista. It is on the coast road, and has a good anchorage ground. Pop. 13,800.

There is a small pueblo of the same name (pop. 2,143) on the north coast of Catanduanes Island, near Albay, Luzon.

**Panda'nus**. See SCREW-PINE.

**Pandarus**, pân'da-rûs, Trójan hero, son of Lycaon. He was given by Apollo a bow with which he became famous as an archer. In the war between the Greeks and Trojans he broke the truce, and after wounding Menelaus and Diomedes was slain by the latter. He also appears in Shakespeare's '*Troilus and Cressida*' as a procurer, whence the English word "pander."

**Pandavas**, pân'da-váz. See MAHÁBHÁRATA.

**Pan'dects**, **The**, the most important compilation of the Roman law, prepared by several scholars at the order of the Emperor Justinian (q.v.). It is also called '*The Digest*.' It was an attempt to form a complete system of law from the commentaries of the great jurists. The work was done by a committee of the jurist Tribonianus and 16 others learned in law; it was begun in 529 A.D. and completed in 533. The magnitude of the task becomes apparent from the fact that about 2,000 various treatises were consulted, and from these about 9,000 extracts appear. One third of them comes from Ulpian, one sixth from Paulus, one twelfth from Papinianus, and the rest from 36 other writers. The Pandects, with the Codex Justinianus, became the law for the Roman empire. When the Lombards invaded Italy in 568, they overturned almost all the few remaining Roman institutions, the law courts among them. In Ravenna, however, the Roman law was still taught; and the Lombards allowed their Roman subjects to be judged according to the Roman law. The Codex, which begins with an invocation to the Trinity, and contains a great deal of legislation on ecclesiastical matters, was held in esteem by the clergy; but the Pandects were at first ignored, as being the work of pagan jurists. In the last part of the 11th century, however, there was a great revival of the study of Roman law. Irnerius of Bologna, the greatest teacher of his time, renewed the study of the Pandects, which, together with the Codex, became the basis of all





medieval legislation. The Pandects may justly be considered the most famous collection of law ever made. In both its central idea of codification and its content and phraseology it has profoundly influenced subsequent legislation, including that of New England and the United States.

**Pandora**, in Greek mythology, the first woman; so called because she received gifts from all the Olympians. She was the creature of Prometheus, and the gods came down to see her, and conferred their gifts on her. Athena instructed her in all works of female skill. Aphrodite endowed her with beauty and fascination. Hermes inspired her with a desire of pleasing, and taught insinuating words. Athena carried her thus equipped into the assembly of the gods, and all admired the work. She became the wife of Epimetheus, a mortal, brother of Prometheus, and brought sorrow into the world by opening, in her curiosity, a box containing the blessings of life; all these escaped, save Hope. This is clearly a late and philosophic addition to the myth.

**Pandours**, pân'doorz, or **Pandoors**, the name formerly given to the Servian or Raitzian foot-soldiers coming from the village of Pandur, in the county of Sol, in Lower Hungary. They were at first irregular troops. In 1750 they were made regular troops.

**Panel**, (1) in law, a schedule, or roll of such jurors as the sheriff returns to pass upon any trial; and impaneling a jury is returning their names in such schedule of parchment. In Scottish law the prisoner at the bar is the panel. (2) In carpentry, a tympanum or square piece of thin wood, sometimes carved, framed, or grooved in a larger piece, or between two upright pieces and two cross pieces. (3) In masonry, a face of hewn stone. (4) In bookbinding, a depressed part of the sides within a relatively elevated bordering portion; or a space on the back between bands. (5) In mining, a system of coal mining in which the projected winning is divided into large, square allotments, divided by massive walls of coal, instead of placing the whole working in one undivided arrangement. The pillars are left very large, the rooms small; the pillars are worked out, props being substituted; these are knocked out, and the goaf filled up by the caving down of the ceiling. (6) In painting, a piece of wood—oak, chestnut, or white poplar—on which, instead of canvas, a picture is painted. The earliest paintings in oil were generally executed on panels, which were composed of various pieces of wood, cemented together with cheese glue; and this glue, or cement, caused each portion to adhere so firmly that such panels were considered stronger than those which consisted of one piece of wood only.

**Pangasinán**, pân-gā-sē-nān', Philippines, a province of the Island of Luzon, in the western central part of Northern Luzon at the head of the Gulf of Lingayen; length, east and west, 56 miles; width, 33 miles; area, 1,316 square miles. The province is mountainous in the northeast, and also near the western boundary; the rest of the surface is flat, sloping toward the sea, and near the coast is very low and frequently inundated by the rivers. There are numerous rivers, of which the Agno is largest and most important. The staple crop is rice, though this is often injured by floods; sugar, corn, tobacco, and co-

conut are also abundantly cultivated; the nipa palm grows luxuriantly. There are abundant deposits of salt, and also gold, copper, iron, magnetite, and sulphur. The important industries besides agriculture include the making of nipa wine, the weaving of buri, and manufacture of mats, hats, and sacks, and boat building. The Gulf of Lingayen affords excellent commercial facilities; the commerce is carried on almost wholly by the Chinese. Many of the rivers are navigable for some distance; well constructed roads extend all over the province, and the Manila & Dagupan Railroad also crosses the province. Pop. 302,178, mostly Pangasináns.

**Pangasináns**, a group of tribes of the Philippine Islands inhabiting the province of Pangasinán, Luzon and some localities in the province of Zambales, Nueva Ecija, and Benguet. They are of the Malay race, and at the time of the arrival of the Spaniards had a civilization and written language of their own. Their language is now generally spoken in the province of Pangasinán. They are Christians.

**Pangenesis**, a theory advanced by Darwin to account for the phenomenon of heredity, and especially to explain the (alleged) inheritance of acquired characters (effects of use and disuse of parts) which formed the basis of the theory of evolution of Lamarck. (See LAMARCKISM.) The problem was to form a hypothesis by which changes in any part of the body could so affect the germ-cells that the parental peculiarities should re-appear in succeeding generations. Darwin supposed that every cell of the body gives off at every stage of its existence minute particles, or gemmules, which when furnished with proper nutriment will give rise to parts similar to those from which they were derived. These gemmules are collected from every part of the body to form the sexual elements, and their development in the next generation forms a new being. To explain the fact that characters may skip a generation he assumed that the gemmules may lie dormant for a time. This theory was weak in that it assumed the existence of particles of which we have no other evidence, and it was shortly disproved by Galton. If these gemmules are constantly given off they must be carried by the blood and hence if introduced into another animal they must effect the progeny. Galton introduced into the blood of silver-gray rabbits the blood of rabbits of other colors, in some cases to the extent of half the blood, but the offspring invariably showed no trace of change of color. Brooks in his 'Heredity' (1883) modified the theory so as to avoid Galton's experiment, but the theory has been dropped in later years, and has only a historic interest. Consult: Darwin, 'Variation of Animals and Plants under Domestication' (1868), and the authorities mentioned under HEREDITY.

**Pango-Pango**, päng'gō-päng'gō, or **Pago-Pago**, a harbor on the south coast of the island Tutuila, Samoa. It is L-shaped, with the greatest length (17 miles) from east to west. It is land-locked and in every way one of the finest harbors in the Pacific. It was ceded to the United States as a naval and coaling station in 1872, and the cession was confirmed by a treaty signed in 1878, by which the United States was given the right to establish at the

harbor a station for coaling, naval supplies, freedom of trade, commercial treatment as a favored nation, and extra-territorial consular jurisdiction. It was occupied by the United States in 1898, with the purpose of utilizing its advantages as a coaling and supply station; and by the agreement of 1899, the island of Tutuila came into the possession of the United States. See SAMOAN ISLANDS.

**Pan'golin**, or **Scaly Ant-eater**. See MANIS.

**Pangutarang**, pāng-oo-tā'rāng, a group of islands of the Sulu Archipelago, lying in the Sulu Sea, northwest of the island of Sulu and west of Mindanao. The group includes 13 islands of which the two largest are Pangutarang, 44 square miles, and Panducan, 14 square miles; the area of the whole group is 72½ square miles. The islands are moderately high, and are very heavily wooded. The chief industries are fishing, and agriculture which is carried on in the rudest and most primitive manner. The island of Pangutarang is low and level; it is thickly populated and carries on a considerable trade with Sulu.

**Pan'han'dle**, The, a long, narrow strip of land, resembling the handle of a pan, generally projecting from a State or Territory, as the Panhandle of West Virginia, or the Panhandle of Idaho. There is also a well-known projection in Texas called the Panhandle.

**Panic**, in finance and commerce, a word denoting insecurity and danger to money values and credits. When a panic occurs the banks are besieged by depositors, money is hoarded and general financial distrust ensues. The word is also applied to sudden displays of terror and alarm at public gatherings, theatres, etc., as in case of fire. The most noted financial panics since 1750 were as follows:

- 1763 Amsterdam. Heavy failures in Holland, England, and Hamburg.
- 1773 Holland. Failures exceed \$50,000,000.
- 1793 England, owing to French war. Government issued \$25,000,000 Exchequer bills.
- 1799 England. Panic at Liverpool. Government lent \$2,500,000 in Exchequer bills on goods. Eighty-two failures at Hamburg.
- 1814 England. 240 banks stopped payment.
- 1825-1826 England. 770 banks stopped payment owing to failure of South Sea bubble companies. Owing to the distress occasioned by the consequences of this panic, families in Yorkshire were reduced in 1829 to live on bran. From the same cause about 200,000 families emigrated to the Continent, America, etc., in four years.
- 1831 Calcutta. Failures, \$75,000,000.
- 1837 United States. "Wild Cat" crisis.
- 1847 England. Owing to excessive railway speculation. Failures, \$100,000,000. Discount rate, 13 per cent.
- 1857 United States. Failures \$555,000,000. Minor crisis in England.
- 1866 London. Owing to over-speculation. Total failures, above \$500,000,000. The last of the serious panics.
- 1873 United States. Heavy failures in New York and elsewhere.
- 1884 Grant & Ward and Marine Bank failures.
- 1885 London. Much temporary disturbance owing to expected Russian war.
- 1890 London. Baring crisis. Liabilities guaranteed by English banks.
- 1892 Financial crash in Australia.
- 1893 United States. The silver crisis, also by some attributed to fear of changes in tariff by the Democratic party.
- 1907 United States. Crisis brought about by reckless speculation and improper management of financial institutions.

See also BANKS AND BANKING; FINANCE.

**Panini**, pā'nī-nī, Indian philologist: b. Salatura (near modern Attock), Punjab, 4th century B.C.; probably the oldest writer on grammar whose works are extant, although he quotes the names of 64 predecessors. He is reckoned among the sages of the Puranas. Nothing is known of his life. His grammar is in eight books, divided into chapters, and containing 3,996 rules or sutras. Its method is wholly different from that of European grammarians. The separate chapters treat the various phenomena of language as they appear in all the various forms of speech; hence the work is strictly a philosophical treatise, requiring to be studied as a whole, and not conveying sectional information in a form classified for reference according to the European model. His style is condensed, obscure, and difficult to the Western student. He is the first who has classified the philological principles of grammar, as distinguished from the mere forms or parts of speech. He did not treat of syntax, and inflections are not formally given, but must be obtained by a collation of separate rules. The grammar of Panini has been often annotated. Its chief critic is Patanjali (q.v.). The chief edition of Panini is by Bothlingk (1887), and that of Patanjali's 'Great Commentary' by Kielhorn (1878-85).

**Panipat**, pā-nī-pūt', or **Paniput**, India, town in the district of Karnal, Panjab, about 52 miles north of Delhi, on the Grand Trunk and the East I. R.R.'s. It is a strategic centre; and was the scene of the negotiations of Duryodhana and Yudishthira at the beginning of the 12th century B.C., of the Mogul victory of Baber over Ibrahim Lodi, which established the Mogul power in north India in 1526, of Akbar's victory over the Afghans in 1556, which reassured the existence of the Mogul empire, and of the Afghan victory of 1761 over the Mahrattas, which prepared the way for English rule. It exports a coarse sugar.

**Panitan**, pā-nē'tān, Philippines, a pueblo of the province of Cápiz, island of Panay; on the Malinannang River, seven miles south of Cápiz, the provincial capital. Pop. 10,020.

**Panizzi**, pā-nē't'sē, Sir Anthony, English librarian: b. Brescello, Modena, 16 Sept. 1797; d. London 8 April 1879. He was educated at Reggio and the University of Parma. Having taken part in revolutionary movements, he went to England in 1822, and became professor in Italian in University College in 1828. In 1837 he was appointed keeper of printed books in the British Museum, succeeding to the principal librarianship in 1856. He contributed very largely both to the increase of the number of books and to the cataloguing and general arrangement of the library and designed the vast reading-room and its annexes. He edited Boiardo's 'Orlando Innamorato'; Ariosto's 'Orlando Furioso'; and Lord Vernon's reprint of Dante's 'Divine Comedy' (1858). Consult Fagan, 'Life of Panizzi.'

**Panjab**, pūn-jāb', Punjab, or Punjaub. See PUNJAB.

**Panjan'drum**, the name applied to an imaginary personage of power and influence; a burlesque monarch or Great Mogul. The word was originally coined by Samuel Foote in a long string of rigmarole as a test for Macklin, who boasted of his memory. It is also called the Grand Panjandrum.

**Panjnad.** See PUNJNAD.

**Panmixia**, in the theory of organic evolution, the cessation of the operation of natural selection. The process of the survival of the fittest, says Parker, has a reverse side, which has been termed the elimination of the unfit. Of the varieties that appear, some are less completely adapted to their surroundings than the majority, and these (the conditions remaining the same) tend to become destroyed owing to their unfitness to cope with their environment. The result of this process of elimination (apart altogether from the selection of progressive variations by which evolution, according to the theory, proceeds) is to keep up a certain standard of efficiency in the organs of the members of the species. Under certain conditions this sustaining influence, as we may term it, of natural selection may be suspended; the organism may be placed under conditions in which natural selection acts with reduced effect or does not act at all. There is, under such circumstances, no "elimination of the unfit"; and, as a result, fit and unfit survive indiscriminately, inter-breed, and produce offspring, the ultimate outcome in the course of generations being a gradual deterioration in the whole race.

This suspension of the influence of natural selection or *panmixia*, acts more commonly on single organs than on the entire organism. Thus, if, owing to some change in surrounding conditions, an organ is no longer kept up to the previous degree of efficiency by the elimination of the individuals in which the organ in question is imperfectly developed, and, as these cross with one another, offspring is produced in which the organ is below the efficient standard; and by a continuance of this process through a series of generations, it is supposed that the organ gradually dwindles in size, and may altogether disappear. The cetaceans furnish good examples of the process. Consult Parker and Haswell, 'Text-book of Zoölogy' (1897).

**Pannonia**, *pa-nō'nī-a*, in ancient geography, a Roman province on the Danube, including what is now western Hungary, Slavonia and Bosnia, eastern Austria and Styria. Neither of the origin of the name nor of the inhabitants, the Pannonians, is anything certain known, but the people may have been of Illyrian stock with an admixture of Celtic due to a Celtic invasion in the 4th century B.C. They were conquered by the Dacians about 50 B.C. Octavian defeated them in 35-34 B.C., but they rose a generation later and Pannonia was finally conquered in 9 A.D., but not occupied save on the frontier until 102-107 A.D., by Trajan. The principal cities planted by the Romans were Vindobona (Vienna), Carnuntum (near Deutsch-Altenburg), Savaria (Szombathely), Arrabona (Raab), Siscia (Sissek), Poetovio (Pettau), Aquincum (Altofen), and Sirmium (Mitrovitza). Trajan divided the province into a lower and an upper Pannonia. In the beginning of the 5th century Valentinian III. of the Western empire ceded Pannonia to Theodosius II. of Byzantium, who surrendered it to the Huns. It was occupied by the Ostrogoths about 450 A.D., by Theodoric of Italy in 488, by the Lombards in 527, and by the Avars in 568. Then came the influx of the Slavs. Consult Jung, 'Römer und Romanen in den Donauländern' (1887).

**Pano** (*pā'nō*) **Indians**, a South American tribe living along the banks of the Ucayali and Huallaga rivers in Peru. They were formerly very numerous but now number less than 2,000. During the 17th century the missionaries persuaded many of them to gather in the mission villages. They were of a rather low grade, but understood hieroglyphic writing on bark. When the missions were broken up, in 1767, most of the Panos returned to their savage life, forming numerous small tribes. They have always been friendly to the whites. They are expert boatmen and build canoes some of which are 40 feet in length.

**Pano'an Indians**, a South American family comprising upward of 20 tribes and occupying the forest regions of Peru, Bolivia and Brazil. Among the better known tribes are Cashibo, Conibo, Mayoruna, Pano, Remo and Setebo. They are a savage race in all that the name implies and several of the tribes practise cannibalism. They have steadily decreased in number during recent years.

**Panorama**, a picture representing a wide or general view, as of a large tract of country, so exhibited a part at a time by being unrolled and made to pass continuously before the spectator. It was invented in England in 1787 by Robert Barker. See also CYCLOPAMA.

**Panpipe**, an ancient wind instrument, undoubtedly the precursor of the organ (q.v.). It was formed of seven, eight, or nine short hollow reeds, fixed together by wax, and cut in graduated lengths so as to produce a musical scale. The lower ends of the reeds were closed, and the upper open and on a level so that the mouth could easily pass from one pipe to another.

**Panslavism**, a general name for the efforts of the Slavonic races in Europe for a unity of civilization and literature. An anonymous work, the European Pentarchy (1839), and the writings of A. Gurovski, made a considerable impression in favor of a union under Russia; while later events favored the Austrian headship; but none of these projects ever possessed a reasonable chance of realization. The mere fact that the Slavonic race comprises nations so bitterly hostile as Russia and Poland, not to speak of geographical and political difficulties, and of such diversities of religious creed as are contained within the range of Christianity and Mohammedanism, made any attempt to unite the scattered elements of such a race in a voluntary political union impracticable. For similar reasons little more real progress has been made with the attempt to promote a literary union.

The most important effort put forth toward the realization of a political union of the Slavs was in 1848, when, stimulated by the rival efforts at union of the German nations, and especially by the summons to Bohemia to send her full contingent to the German parliament, the Slavonic clubs summoned a congress of all the Slavs in the Austrian Empire, with a view to confer on the constitution of the empire. The congress met at Prague on 2 June. The various nations represented were classified in three departments: the first, consisting of the Bohemians, Moravians, Silesians, and Slovaks or Western Slavs; the Poles and Ruthenians forming the Eastern Slavonians; the Slovenians, Croats, Servians, and Dalmatians the southern

division. Each of these divisions chose 16 members, who formed a committee, with Palacky at their head, who drew up a plan of confederation and alliance among the various nationalities of the empire. The proceedings of the congress, however, which had to be conducted in German, as the only common means of communication, could not be brought to a formal conclusion, and the congress was interrupted by a Slavonic insurrection, which proved futile. Since 1866 renewed but unavailing efforts have been made by the scattered Slavonians of Austria to form a union among themselves, in order to counterbalance the preponderance of the German and Magyar races.

**Pansy**, an annual or imperfectly perennial herb (*Viola tricolor*) of the order *Violaceæ*. It is a native of Europe where it has been in cultivation for at least 400 years, and whence it has been taken to all cool temperate climates of the civilized world. The plant, which is rarely more than six inches tall, bears long-petioled, heart-shaped leaves, and large irregular flowers which slightly resemble the human face. Its name is a corruption of the French, *pensée*, thought, and its old folk-name, "heart's-ease," signifies remembrance, a double reason for its popularity. Few flowers show the effects of care in selection more than the pansy. Naturally the blossoms are borne upon rather short stalks and are less than a third the size of improved varieties, which often attain a diameter of three inches. In dry climates fresh seed must be imported annually, since home-grown seed even of improved strains is apt to produce flowers inferior to the imported, each year emphasizing the deterioration. The cultivated pansies are grouped in strains rather than as individual varieties, and as a rule exhibit mixtures of blue, white, and yellow, although some kinds are all of one color. Pansies thrive best upon rather heavy loams well drained and well supplied with plant food and humus. In the United States and other countries where the air becomes very dry during the summer, the plants generally fail during the hot months, even when planted in shady places, the most favorable situations. Hence, in such climates the seed is usually sown in cold frames during August or September, kept cool and moist by a rather thick mulch of loose straw until the plants appear, and then these are protected from drying winds. Being tolerably hardy the plants can be left in the frames during winter, previously having been transplanted from the seed-bed so as to stand about two inches apart. In the spring they may be allowed to blossom where they stand or may be transplanted to garden beds as soon as the ground can be worked. After flowering in these beds for a month or six weeks they should be replaced by geraniums or other heat-loving plants.

**Pan'theism** (Greek, *pan*, all, and *theos*, god), in philosophy, the doctrine of the identity of God and the material world. The doctrine stands midway between atheism and dogmatic theism. There are only three ways in which the philosopher can deal with the idea of the existence of God, that is, of a being who is the cause or original sum of all being. He may deny his existence altogether, or may infer psychologically that there is a God, and proceed to the inference that he is the first cause of all things, but leave unexplained the nature of the

relation between God as cause and other existences as effects. Finally, he may proceed to reason back from the effect to the cause, and show a necessary connection between them. The last process is the source and explanation of pantheism. The origin of the idea of a God with the theist and the pantheist is the same. It is by reasoning upon ourselves and the surrounding objects of which we are cognizant that we come to infer the existence of some Superior Being upon whom they all depend, from whom they proceed, or in whom they subside. Pantheism assumed the identity of cause and effect, and the consequent adequacy of each effect, rightly interpreted, to indicate its cause. Matter, not less than mind, is with it the necessary emanation of the deity. The unity of the universe is a unity which embraces all existing variety, as proceeding from it in a way necessarily explicable by the result. Hence each existing thing contains all the explanation of its own existence which it is capable of receiving.

The earliest school of Greek philosophy, the Ionian, in as far as it admitted any theism, was essentially pantheistic; and to the same school of pantheism belong Epicurus and Lucretius in ancient, and Giordano Bruno in modern times. The atomic theory, or the origination of all things in conscious atoms, is the culminating theory of this school. The Sankhya of Kapila, one of the most celebrated Indian systems of philosophy, in which probably originated the Buddhist religion, was the chief representative of pantheistic tendencies in the East. Kapila enumerates 25 first principles of things: of which the first (*mulaprakriti*) is matter; the second (*buddhi*), intelligence; the third (*ahan-kara*), self-consciousness. Speusippus, the sister's son and successor in the Academy of Plato, might be called an ultra-pantheist. He taught, what may possibly be considered the true logical culmination of the doctrine, that the Divine or Best is first indeed in rank, but is chronologically the last product of development. He defined happiness as the habit of conformity to nature. The soul, according to him, was a higher union of the arithmetical and the geometrical, or extension harmoniously shaped by number. The Stoics, differing widely from the school of Epicurus, may also be numbered among the adherents of pantheism. Their doctrine was that whatever is real is material. The universe as a whole possesses consciousness, and this consciousness is deity. The world undergoes a constant evolution, the elements of water, earth, and air being evolved out of fire, which again absorbs them, and the process recommences in an eternal cycle. The human soul and the deity, which are one in nature, act and react on each other. Intelligence, whether in man or the deity, they considered as consisting chiefly in force. Perhaps there is nothing which seems more opposed to pantheism than the mysticism of the Alexandrian school, and particularly of Plotinus, which makes of God so pure an abstraction that even thought, without being separated from individuality, cannot attain to it. Yet from the bosom of this school a prolific source of pantheism has arisen. Dionysius, the pseudo-Areopagite, a Christian philosopher of the Neoplatonic school, introduced it among his speculations, in which the particular is derived by a series of gradations, as genus and species, from the universal. John Scotus Erigena, the founder

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of the scholastic philosophy of the Middle Ages, gave this speculation a realistic turn, making God the essence of the world, and the universal, the genus, the species, and the individual so many particular developments which actually succeed each other. Eckhart, a German philosopher of the beginning of the 14th century, also a disciple of Dionysius, and often regarded as the father of German philosophy, taught some views which were developed in a pantheistic direction by some of his followers. Eckhart held that the works of creation were eternally in God in idea or conception; this was developed into a pantheistic doctrine of the eternal existence of ideas or types of all things. Giordano Bruno, like Epicurus and Lucretius, taught that monads are the elements of all existing things. God is the imminent cause of the universe. Power, wisdom, and love are his attributes; but he is the monad of monads, the minimum because all things are external to him; the maximum because all things are in him. He produces the worlds freely, but by an inner necessity of his nature. The worlds are nature realized; God is nature working. Stars are moved by the souls that reside in them. God is in all things, as being in things that exist, or beauty in objects that are beautiful.

No modern pantheist has acquired a greater renown than Spinoza, probably because none has developed his doctrines into a system so comprehensive, or with a logic so rigorous. A disciple of Descartes, he founds upon that master's definition of cause a system in which he develops the relation of God to the universe in a series of propositions, graduated like a succession of consequential demonstrations in mathematics. According to Spinoza the essence of God is existence, and he has two fundamental attributes, extension and thought. All things which exist are modes of God's attributes. Their existence is necessary, and all changes which take place in them, whether affecting intelligent or non-intelligent beings, are necessary. God alone is free, and he is free because he acts by an inner necessity, and is not controlled by any other being. It may be added that Spinoza combats the apparent inference from his doctrine, that the sum of things which exist is God. Things are diverse, complex, and limited, while God is one, simple, and infinite. They are not God, but only the necessary modes of his attributes. Among modern pantheists a place is also due to Leibnitz. According to him all souls are monads, or atoms containing active powers consisting in ideas. God is the primitive monad; all other monads are its fulgurations. Bodies, as plants and minerals, are aggregations of sleeping monads with unconscious ideas. The relations of the monads are purely mechanical, and their co-operation is determined by the theory of pre-established harmony. (See *MIND, HUMAN*.) Diderot recognized God in natural law, truth, beauty, and goodness; for Leibnitz's monads he put atoms, and gave them sense in place of ideas, which became thought in organized beings. Finally, the modern doctrine of evolution, when it assumes a transcendental form, and carries speculation as to the origin of things beyond the range of inferences founded on the observation of nature, is necessarily pantheistic.

**Pan'theon**, anciently a name applied to a temple or shrine dedicated to the gods. The

most historical pantheon is that erected in Rome by Agrippa about 25 B.C. and dedicated by him as a temple to all the gods. For 13 centuries it served as a Christian church, having been dedicated by Boniface IV. about the year 607. It is 188 feet in circumference and is covered by a dome 142 feet in span. The entire height is 141 feet. Raphael and Victor Emmanuel II. are buried in the Pantheon. Another noted structure bearing this name is the Pantheon of Paris (Church of Saint Genevieve), for a description of which see *PARIS*.

**Panther**, some large cat, in North America usually a cougar; in South America a jaguar; in India or Africa, a leopard.

**Panther-cat**, a name locally given to several spotted wildcats; most often, probably, to the ocelot (q.v.).

**Pan'tograph**, an instrument by the aid of which maps, plans, and designs may be copied mechanically, either on the scale on which they are drawn or on an enlarged or reduced scale. It is made in a variety of forms.

**Pan'tomime**, the name given by the Romans to an actor in a dramatic performance consisting of dance and gesture. This sort of representation appears to have been indigenous to Italy. The modern Christmas pantomime in Great Britain is a spectacular play of a burlesque character, founded on some popular fable, and interspersed with singing and dancing, followed by a harlequinade, the chief characters in which are the harlequin, pantaloons, columbines, and clowns.

**Pantop'oda**, or **Pycnogonida**, a group of marine spider-like, but hard-shelled arthropods, which is classified near the horseshoe crabs (*Limulus*). The body (*cephalothorax*) is so small and the limbs are so large that the animal, which may span two or three inches in large species, seems all legs, and a popular name along the New England coast is "no-body crab." There are four pairs of equally large many-jointed walking legs, in advance of which are two pairs modified into chelate mouth-organs, and a third pair upon which, in the breeding season, the male carries the eggs cemented to these appendages. The abdomen is represented by only a small tail-like part posterior to the legs. A metamorphosis occurs in most species, and the larva looks something like a nauplius, but is not equivalent to it. These curious creatures live from the shore-line to deep water.

**Panuco**, pá'noo-kō, (1) river of Mexico, rising in the plateau north of the City of Mexico and flowing generally northeast. It forms part of the boundary of Tamaulipas and Vera Cruz and receives the waters of several smaller streams before emptying into the Gulf of Mexico near the city of Tampico (q.v.). Its bar has been removed by elaborate engineering works and the river mouth is now a fair port. (2) A district about this river, so called by Cortez and his followers. It was partially conquered by Cortez in 1522, but in 1526 was granted to de Guzman, who was independent of Cortez.

**Panyasis**, Greek epic poet of the 5th century B.C., ranked one of the five great epic poets of Greece for his poems on Heracles and on the Ionic migration. He was born in Halicarnassus, and is thought to be the uncle of

**Herodotus.** His few fragments are edited by Kinkel (1877); the most important are on wine, its use and abuse.

**Paoay**, pā-ō-i', Philippines, pueblo, province of Ilocos Norte, Luzon, three miles inland from the western coast, on a small lake; 12 miles south of Laoag. It is on the main highway. Pop. 11,850.

**Paola**, pā-ō-lā, Kan., city, county-seat of Miami County; on the Missouri P., the Missouri, K. & T., and the St. Louis & S. F. R.R.'s; about 45 miles south by west of Kansas City. It was settled in 1855 and in 1869 was chartered as a city. It is in a fertile agricultural country and in a natural gas belt. Coal deposits are in the vicinity; cultivating grain and stock-raising are prominent industries in this section. The trade is chiefly in wheat, corn, live-stock, and coal. It is the seat of the Ursuline Academy, and has public and parish schools and a free public library which contains about 6,000 volumes. Population (1910) 3,207.

**Paoli**, pā-ō-lē, **Pasquale de**, Corsican patriot: b. Morosaglia, Corsica, 26 April 1725; d. near London, England, 5 Feb. 1807. He was educated at the Jesuits' College at Naples, and in 1755 was appointed captain-general by his countrymen, then struggling for their independence against Genoa. By his energetic efforts the government and military resources of the island were reformed, and he maintained a protracted and generally successful struggle with the Genoese. The latter, however, first made an agreement with France to garrison the places held by them in Corsica, and finally, in 1768, sold the island to France. After a brief struggle Paoli was obliged to yield, and fled to England. Here he remained 20 years, till the revolution of 1789, when he was recalled by the national assembly and made lieutenant-general of Corsica. Dissatisfaction with the extreme measures of the revolutionists in France soon led him to throw himself into the arms of England; in 1793 a British army was landed in Corsica, and through his influence the crown was offered to George III., in 1794. Paoli, however, did not obtain the government of the island and withdrew to England and was pensioned by the British government. His remains were removed to Corsica in 1889. Consult Arrighi, 'Histoire de Pascal Paoli' (new ed. 1891).

**Papacy**, the doctrine of the Roman Catholic Church relative to the authority of the Pope, that is, the Papacy, was officially promulgated by the Council of the Vatican in 1870. The primacy, it teaches, over the entire Church was conferred by Christ on Peter; and this primacy was one, not of mere dignity, but of full and supreme jurisdiction. This supreme authority is exercised by the Bishops of Rome "for none can doubt; and it is known to all ages, that the holy and blessed Peter, the prince and chief of the Apostles, the pillar of the faith, and foundation of the Roman Catholic Church, received the keys of the kingdom from our Lord Jesus Christ, the savior and redeemer of mankind, and lives, presides, and judges, to this day and always, in his successors, the bishops of the Holy See of Rome, which was founded by him, and consecrated by his blood." Hence, the council continues, the Roman See possesses a

superiority of ordinary power over all other sees; and this power of jurisdiction is immediate, so that to it all bishops, pastors, and the laity, both individually and collectively, are bound to submit, not only in matters which belong to faith and morals, but also in those that appertain to the discipline and government of the Church. In virtue of this supreme power, the Roman Pontiff claims the right of free communication with the bishops of the entire world, and their flocks. To him as to the supreme tribunal, in all causes, the decision of which belongs to the Church, recourse may be had, and from his judgments there is no appeal. The assertion that it is lawful to appeal from him to an ecumenical council is condemned as false. The infallibility of the Pope in doctrinal matters is thus defined:

We teach and define that it is a dogma divinely revealed: that the Roman Pontiff, when he speaks *ex cathedra*, that is, when, in discharge of the office of pastor and doctor of all Christians, by virtue of his supreme Apostolic authority, he defines a doctrine regarding faith or morals to be held by the Universal Church, by the divine assistance promised to him in blessed Peter, is possessed of that infallibility with which the divine Redeemer willed that his Church should be endowed for defining doctrine regarding faith or morals: and that, therefore, such definitions of the Roman Pontiff are irreformable of themselves and not from the consent of the Church.

It is not now maintained that the full significance of the Petrine primacy was manifest from the first in the life of Christianity; but rather, that there was, from the beginning, to borrow Cardinal Newman's words, a certain element at work, or in existence, divinely sanctioned, which for certain reasons did not at once show itself on the surface of ecclesiastical affairs, but gradually with the expansion of the Church, and in response to the needs of the times, developed into full vitality. What was the date of Peter's first appearance in Rome is not clear. Critics of all shades agree that Peter was in Rome in 64, when the Christian community was already established, and that he suffered martyrdom there during the reign of Nero. Roman Catholic writers lay stress on the testimony of Eusebius and Jerome who refer to tradition in proof that Peter had been in Rome before 64. The earliest picture that we have of the Christian Church presents the community rather than the bishop. The writings of Clement seem to point out the community as the seat of authority: the letter ascribed to Ignatius of Antioch addresses the Church of the Romans; and Pope Soter in 170 speaks as in the name of the community, rather than in his own. But the march of events rapidly brought about two results, the domination of the bishops over the various churches and an active preeminence of Rome over the others. After the fall of Jerusalem, Rome, the political mistress of the world, soon became the centre of Christianity; other bishops begin to consult Rome on ecclesiastical matters. Polycarp, the disciple of Saint John, had recourse to Anicetus on the vexed question of the Paschal celebration, though, it is true, he declined to abandon the Asiatic for the Roman custom. In 194 Pope Victor took steps to enforce the Roman discipline by the excommunication of recalcitrants. From the middle of the 2d century, the Gnostic and Montanist controversies served to bring the Roman authority into prominence. To the Church of Peter, as



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to the witness of traditional doctrine disputes were referred. The imperial government, too, recognized the precedence of the Roman bishops over all others; the Emperor Aurelian, in 274, decided that the Christian Church property in Antioch should be dealt with as the bishops of Rome and Italy thought fit. In 256 Cyprian of Carthage speaks of Rome as the seat of the Primacy. During the 4th and 5th centuries the Roman Primacy looms larger and larger. The facts which indicate this rising domination are admitted by Protestant historians as well as by Roman Catholics. Newman cites as sufficient evidence for the 4th century the following passage from the Anglican Bishop Barrow:

The Pope's power was much amplified by the opportunity of persons condemned or extruded from their places, whether upon just accounts or wrongfully, and by faction; for they, finding no other more hopeful place of refuge and redress, did often apply to him; for what will not men do, whither will not they go in straits? Thus did Marcion go to Rome and sue for admission to communion there. So Fortunatus and Felicissimus in Saint Cyprian, being condemned in Africa, did fly to Rome for shelter; of which absurdity Saint Cyprian doth much complain. So likewise Martinus and Basilides in Saint Cyprian, being outed of their sees for having lapsed from the Christian profession did fly to Stephen for succor, to be restored. So Maximus the Cynic went to Rome to get a confirmation of his election at Constantinople. So Marcellus, being rejected for heterodoxy, went thither to get attestation of his orthodoxy, of which Saint Basil complaineth.

Many other instances of Papal interference for the restoration of bishops, or the appointment of new bishops, and the designation of others to act as vicars of the Pontiff are also cited from Barrow. While the apologists of the Papacy and its antagonists agree upon the facts, they differ in their respective interpretations of them. What one side considers as evidence of the universal recognition accorded to the primacy, the other treats as evidence of an ever widening policy of "papal aggression." The Protestant theologians, besides, throw emphasis upon a few notable cases of remonstrance addressed by bishops of other sees to the actions of Roman Pontiffs, and see in Cyprian's acknowledgment of the primacy nothing more than an acknowledgment of pre-eminent dignity. The definitive recognition of the spiritual primacy is found in the great council of Chalcedon, presided over by the legates of Leo I. (451). The 630 bishops there assembled accepted as authoritative the profession of faith imposed by the Pope; they are reported to have unanimously exclaimed: "What Leo believes we all believe; anathema to him who believes anything else. Peter has spoken by the mouth of Leo." The removal of the empire to Constantinople was fraught with far-reaching results on the Roman world in temporal as well as in spiritual affairs. In the 9th century writers is found a story that, on his withdrawal from Rome, Constantine granted to Pope Silvester Rome, Italy, and the Western islands. This famous Donation of Constantine was treated as authentic by the canonists and jurists of the Middle Ages. "It is," says the latest English Roman Catholic historian of the Papacy,

a prophecy after the event. Paganism, abandoned, and soon to be persecuted by its Pontifex Maximus, without the conviction that makes martyrs, and long a hollow formality was dying. Christians had the State in their hands. What was more, they showed the fiery zeal, the proselytizing spirit, the exuberance in quarrels

among themselves, which are signs of a youth rich in hopes, bent upon shaping its own victorious future. Heathen Rome invited them to subdue it. Public policy required that the centre of administration should be at the heart of the Empire. The balance of power was displaced. Neither Pope Silvester, nor any Pope for centuries, dreamed of disowning the Imperial rule; from the Goths in Italy they suffered grievous things as the first subjects of Constantinople. But Rome left to herself was Rome in the hands of the Papacy; fronting the west and the barbarians. Constantine had imitated Alexander, who in setting up his throne in Babylon in 330 B.C.—a curious coincidence—and assuming the tiara, left Europe free to follow its own fortunes. Such was the real Donation, not understood at the time by Pope or Emperor, which never lost its force until the northern nations grew into a world as rich, as cultivated and as haughtily self-conscious as the Greek.

The capture of Rome by Alaric in 410, the subsequent invasions of Italy by Attila the Hun, and Genseric the Vandal, reduced the imperial authority to the shadow of a great name, and the wane of Byzantine influence was accompanied by a corresponding growth of political power in the Papacy in whom the people found their only protection and succor against the barbarians. For a brief interval the genius of Justinian, with the military successes of Belisarius and Nares, brought the Popes once more under the sway of Constantinople. With the rise of the Lombard power in Italy the doom of the Western Empire was sealed. By his vain effort to extirpate the use of images in worship the Emperor Leo the Isaurian (726) drove the Roman and Italian populations to transfer their civil allegiance to the Papacy, which, through the wisdom, administrative ability, virtue, and apostolic zeal of Pope Gregory the Great (590-604) had become the national centre of Italy. The pontificate of Gregory is a luminous phase in Papal history. It witnessed the rise of the Benedictine Order whose monks established Christianity in England and initiated the work of civilizing Europe. The Anglican Bishop Creighton summarizes the immediate and subsequent results of this mission:

While dangers were rife at Rome, a band of Roman missionaries carried Christianity to the distant English, and in England was founded a Church which owes its existence to the zeal of the Roman bishop. Success beyond all that he could have hoped for attended Gregory's pious enterprise. The English Church spread and flourished, a dutiful daughter of her mother-church of Rome. England sent forth missionaries in her turn, and before the preaching of Willebrod and Winifred heathenism died away in Friesland, Franconia and Thuringia. Under the new name of Boniface, given him by Pope Gregory II., Winifred, as Archbishop of Mainz, organized a German Church, subject to the successor of Saint Peter.

The middle of the 8th century saw the alliance of the Papacy with the Franks. The last of the Merovingians had become a puppet in the hands of Pepin, the Mayor of the Palace. The nobles offered the crown to Pepin, who consulted Pope Zachary. The Pope replied: "Let him be King in name, who is in fact so," and Pepin was anointed by the deputy of Zachary (751). This fact became a precedent, in the public law of Europe, for the Papal claim of indirect authority over temporal sovereigns.

The grateful Pepin bestowed on Pope Stephen III. large territories which he had wrested from the Lombards; and in return he received from him the title of Patrician of Rome, an event that opened the way to the establishment of the empire which with the Papacy was to constitute the unity of Christendom. Pepin's son, Charlemagne, was crowned emperor by

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Pope Leo III., in Saint Peter's, at Rome, on Christmas Day, 800. When under the descendants of Charles, the short-lived unity of the empire was broken up into separate states the Papacy stood forth in the minds of men as the paramount authority in the political, as it was in the spiritual world. "The Church," writes Barry,

instead of breaking up as Charles' monarchy had broken up, into petty and opposed principalities, is centralized in the West. A Supreme Court of Appeal is set up in the sight of mankind, its charter the Bible, its weapons spiritual, but entailing penalties in this world. For deposition, interdict, excommunication, greater or less, carry in their train forfeiture of dignity, good, life, and the Holy See can reckon on sentiments which become the foundation of order, in the State and in the Church.

Pope Nicholas I. exercised his supremacy in both realms (858-867). He obliged the Frankish King Lothair II. to take back the wife whom he had attempted to divorce. He deposed the powerful archbishops of Cologne and Trèves who had sided with the King, and against the opposition of the Byzantine emperor he condemned Photius, who had intruded himself into the Patriarchate of Constantinople. About this time appeared the famous False Decretals, which were embodied in the canon law of Europe. This collection of decrees was first presented at the Synod of Quercy in 857, when the Frankish bishops were contending for alleged rights and privileges against their metropolitans. It purported to be the work of Isidore of Seville. There had been a genuine collection edited by this author. But the present volume contained, besides some authentic decrees, the Donation of Constantine, several forged decrees, and acts of spurious synods. The author is generally supposed to have been a Western Frank. His object was to set up an entire immunity for the clergy, and to present the Pope as not only supreme ruler in ecclesiastical affairs, but also the supreme appellant judge in even secular causes. The bishops were exalted, and protected against their immediate superiors, but, on the other hand, they were reduced to something like a condition of feudal vassalage to the Pope. In short, the rights of synods, metropolitans, clergy, and laity were swept away. The general conception embodied in these Decretals was woven into the laws of Christendom during the Middle Ages.

The middle of the 9th century was characterized by a rapidly spreading confusion and civil and moral disorder throughout Europe. The most signal exercise of Papal authority was the conferring of the empire on Charles the Bald by John VIII. The Saracens, the Normans, and the Slavs were carrying their victorious arms into southern, western, and central Europe. Italy was the scene of incessant strife. The popes were unable to resist the attacks and oppression of Italian nobles and Norman chiefs. As the power of the great vassals of the crown increased, the disintegration of the empire continued its course; and something akin to anarchy prevailed. The condition of the Papacy reflected the evils of the times. Disorders in elections, corruption in administration, license in morals, mark the Papal history of this period. In the House of Theophylact the Papacy almost assumed the character of an hereditary monarchy. The lowest depths of degradation were reached when Alberic of Tusculum made his

son, a vicious boy of 12, Pope under the title of Benedict IX. After holding the position for some time, Benedict sold it to Gregory VI., in order to get married. There was another claimant known as Silvester III. Benedict endeavored to resume the sovereignty. Monks like Peter Damian and Hildebrand deplored and endeavored to mitigate the universal disorder. The empire had passed to the German House of Otho. Henry III. endeavored to put an end to the degradation by deposing the three unworthy claimants, and appointing a German to the throne of Peter (1046). Notwithstanding the powerful influence and resolute endeavor of the monk Hildebrand the reign of misrule continued till he himself became Pope, under the name of Gregory VII. He set about the reformation not only of Rome but of the entire Church, recalled the clergy to the vows of their profession, took severe measures against the universal vice of simony, and asserted the Papal claims against the secular powers. A long struggle of much vicissitude against the imperial power ended by the humiliating capitulation of Henry IV. at Canossa (1076). The influence of the universities, especially those of Paris and Bologna, contributed, by their teachings in law, philosophy and theology, to establish the majesty of the Papacy as the supreme authority in the opulence of power ascribed to it by the Decretals of Gratian. The Crusades gave exercise to the Popes' claim of suzerainty over all the temporal rulers of Europe. The Papal dominions were enriched in 1115 by the Countess Matilda's bequest of her extensive possessions. A long quarrel with the emperors concerning the right of ecclesiastical investitures ended in a further triumph of the Church over secular feudalism; the Concordat of Worms, however, conceded to the emperors the right to send deputies to the election of German bishops, and of investing them with the regalia before episcopal consecration. This was the first of the Concordats between the Papacy and the States which indicate the growing restlessness of the civil powers. About the middle of the century a more serious conflict arose between the Popes and the Hohenstaufen emperor, Frederick Barbarossa, who undertook to restore the imperial authority over the Italian states, and establish his sway over both clergy and laity. The genius of Alexander III. triumphed; and Frederick, like Henry IV., was obliged to submit (1177). Everywhere, however, the young nations of Europe, developing their national codes, and becoming conscious of their strength, were, at the end of the 12th and the beginning of the 13th century, showing signs of restiveness under the dominion of the Church. In England Henry II. began his struggle with Thomas of Canterbury. The Constitutions of Clarendon claimed almost as much for the civil power as was demanded afterward by Henry VIII. Fearful that Henry might join hands with Frederick, the Pope temporized. But when the death of Becket stirred up the people against the King, the Plantagenet was compelled to sue for peace no less humbly than the Hohenstaufen. In the reign of Innocent III. the power of the Papacy reached its zenith. A man of lofty character, indomitable courage, and great political insight, he dictated to the rulers of France, Germany, and England. For a short time the arms of Venice

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brought Constantinople under his spiritual sway. By the help of the crusaders he crushed, with great severity, in northern Italy and southern France the sects which disputed the authority of the Church. The new orders of Saint Francis and Saint Dominic, powerful in their primitive fervor and virtue, renewed the religious spirit in every country, and awakened in the consciences of the people the old devotion to the Church and its sovereign ruler. Innocent, more conspicuously than any of his successors, acted as an independent Italian prince, expelled the imperial officers from the domains which Matilda had given to Rome; and, under him the States of the Church became an autonomous kingdom. Thenceforward we see the Pope strengthened and burdened with a temporal sovereignty; and more than once, in subsequent history, the necessity of defending it becomes a serious embarrassment to him in the discharge of his office of Spiritual Father of Christendom. Though Innocent was successful in asserting his feudal authority, the resistance offered to him indicated that the mediæval awe of the Papacy was rapidly passing away. Some of his acts rankled in the hearts of the peoples, and bore fruit in later times. To trace the effect of his intervention in the affairs of England, by absolving the nation from its allegiance to King John, and by annulling, as vile and base, Magna Charta, the foundation of English liberty, would carry us to the days when, in a darker hour, another Pope, by a similar act of absolution, and of deposition of the sovereign rendered definitive the breach between England and the Holy See.

Another and a final struggle between the Papacy and the German emperors opened with the reign of Frederick II. Frederick attempted to reduce the Popes to a state of dependence, on the imperial authority. Gregory IX. and Innocent IV. vigorously resisted and after a long and demoralizing struggle overcame him; and the Popes did not rest easy till the last of the Hohenstaufens, a mere youth, was beheaded (1286). With Frederick perished the empire which, under Charlemagne, had arisen as the temporal element that in union with the spiritual Papacy had formed the theocracy of the Middle Ages. Though the feudal Papacy had conquered the empire it was not destined long to survive it.

The French influence introduced into Italy soon dominated the elections, and Popes were chosen with a view, not to the interests of the Church, but to those of the French king. In the reign of Boniface VIII. (1294-1303) the Papacy and the secular power closed in a death struggle from which the State rose victorious in the person of Philip the Fair of France. Already, by the instrument known as the Pragmatic Sanction, Louis IX. had claimed for the Gallican Church freedom of patrons from Papal interference, freedom of election to chapters, and immunity from Papal taxation without the consent of the Crown and the Church. The chief sources of revenue exacted by the Popes about this period were the fruits of the first year taken from vacant livings and from money left by previous incumbents; the annates taken from benefices conferred by the Pope; taxes for the confirmations of bishops, and for Pallium fees; taxes for dispensations; Peter's penance;

tributes from secular princes and religious institutions placing themselves under the protection of the Pope; the feudal tax from the vassals of the Pope. The Popes widely exercised the right of presenting to benefices; granting "expectances" to benefices; nominating to certain reserved prebends, and bestowing others in *commendam*. When Philip imprisoned a Papal legate the great struggle was on. In reply, Boniface issued the Bull *Clericis Laicos*, declaring that the civil authority possessed no jurisdiction over ecclesiastics. He summoned the leaders of the French clergy to Rome. Philip and his lawyers answered that the Pope had no authority on temporals, and that his collations to benefices were null and void. Another letter from Boniface told Philip, "Let no one persuade you that you are not subject to the chief of the Heavenly hierarchy." Philip burned the letter. Then came the Bull *Unam Sanctam*, declaring that every human creature is subject to the Roman Pontiff. The end came when, after being maltreated at Anagni by the minions of Philip, he died, in prison, abandoned by all, 11 Oct. 1303. With him the mediæval Papacy passed away. For centuries afterward canonists and theologians continued to recite the right of the Pontiff to take away and to give crowns; but the world took no notice of the claim. Henceforward the Pope is for history the spiritual ruler of the Catholic Church and the sovereign of a small and gradually diminishing Italian state which, in 1870, was, against the protest of the Pope, absorbed in the kingdom of Italy. Even the most hostile historians of the Papacy concede it as much merit as is given it in the temperate words of Barry:

While it leaned on the people its triumph was assured; when it submitted to the feudal system, it courted disaster. Then the royal authority took away its rod of dominion; the King became Pope; the Pontifex Maximus retired into the holy place before him. Crimes, abuses, usurpations, scandals, and a secret change about religion in the thoughts of men account for this latter-day revolution. But it is difficult to imagine how Europe could have survived from the Fall of the Empire to modern times, had there been no central, supreme, and acknowledged power like the Papacy, guardian, at once, of faith, learning, and civilization. That it always rose to the height of that great enterprise will not be maintained by the historian, but its benefits outnumbered by far its abuses; and the glory is not dim which hangs round its memory, when we call to mind that it consecrated the beginnings of a peaceful Christian Europe, and watched beside the springs of art, science, industry, order and freedom.

By the transfer of the Papal Court to Avignon the Papacy passed under French influence, which along with the relaxation and disorders that attended its residence there, seriously impaired its prestige (1305-77). Its return to Rome was the signal for the great schism of the West, in which Pope and anti-Pope contended for the allegiance of a distracted Christendom; till the Council of Constance restored order by the election of Martin V. in 1417. With the passing of the temporal Papacy, the spiritual supremacy of the Pope in the Roman Catholic world became more emphasized. The extent of Papal authority and prerogative in the Church was explicitly defined by the Vatican Council. A decree of the Council of Constance, which assembled in 1414, in order to terminate the Western schism, had declared the Pope to be inferior to a general council. The French clergy, in 1682, subscribed to a set of formulæ, known as the Gallican Articles, which affirmed

that the consilial authority is above the Pope, and, consequently, that *ex-cathedra* Papal utterances are not irreversible until confirmed by a General Council. After a prolonged debate, during which it was manifested that the decrees of Constance were intended to apply only to the occasion which gave them birth, and that the Gallican doctrine had been repudiated by the Church, the Vatican Council settled the question by the definition given above.

The long endurance of the Papacy, during ages which have seen the disappearance of every other European institution that was in existence when the Papacy arose, and of so many others that were, but are no longer, while it stands, is a fact which has arrested the attention of every serious historian. It is appealed to by the Catholic apologist as evidence that the Church is not a mere human institution. To arrive at an impartial estimate of the Papacy, the historical student needs carefully to distinguish its spiritual element—essential and abiding—from its secular adjuncts, which wax large and wane with the vicissitudes of time. A classical explanation and defense of Papal supremacy will be found in Cardinal Newman's 'Anglican Difficulties,' Vol. II. (1898); or in 'The Chair of Peter,' by John Nicholas Murphy (1883).

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**Papain**, a digestive ferment isolated from the juice of the half-ripe fruit of the tropical papaw tree (*Carica papaya*). The juice is used in the West Indies to make meat tender. Papain is a grayish powder, soluble in water and glycerine, insoluble in alcohol, ether, and chloroform. It digests fibrin and albumen more readily than pepsin, and in alkaline, neutral, and acid solutions. It is used in some forms of dyspepsia, as a solvent of false membranes in croup and diphtheria, and for the removal of warts. As a solvent it is used in solution (5.15 per cent) in equal parts of water and glycerine. It has been recommended as a galactagogue and an anthelmintic.

**Papajo** (pā'pā-hō) Indians, an American tribe of the Piman family originally occupying a large part of Arizona. Branches of the tribe extended into Mexico. They were early christianized by the Jesuits and Franciscans and are nearly all devout Roman Catholics. They were once recognized as citizens by Mexico, but after the annexation of the Arizona country by the United States, the Papajos lost not only their citizenship but their lands and water rights, and were persecuted by the white settlers. During the early part of the 19th century they were almost constantly at war with the Apaches. They now number about 4,000, live on reservations and are devoted to agriculture.

**Papal Guarantees, Law of**, a law passed in 1871 by the Italian legislature with a view to adjusting the disputes between the papal curia and the civil government. It had all the appearance of a liberal, even generous, attempt at conciliation and the establishment of mutual independence. Its principal provisions were as follows: (1) The pope was secured the standing of a sovereign power with a court, special ambassadors at Rome, separate postal and telegraphic communication with other countries, and an annual salary of 3,225,000 francs from the

national exchequer. (2) The Vatican and Lateran Palaces, etc., were settled on Pope Pius IX. and his successors. (3) The *placet* or *exequatur* of the king was not to be required as a ratification of acts of papal authority in ecclesiastical matters. Bishops were not obliged to take oath of allegiance to the king. (4) The clergy were granted the right of assembling. (5) While the ecclesiastical courts were to have the right of deciding cases brought before them without any appeal against their decisions to the civil courts, the aid of such courts in enforcing her decisions was to be denied to the church. The opinion of the Liberals was that this measure gave the pope too much independence, and when it was submitted to the Powers England refused her sanction. Finally the pope decided not to consider the Law of Papal Guarantees but to remain at Rome in his own right, without asking anything of the civil government.

**Papal States.** See CHURCH, STATES OF THE.

**Papantla**, pā-pānt'lā, Mexico, town in the state of Vera Cruz, 115 miles northwest of Vera Cruz, on a well-watered plateau. It is in the centre of the vanilla district and has a population of 10,000. About seven miles from the city is a famous teocalli with other ancient ruins, all overgrown with tropical vegetation.

**Paparrhigopulos**, pa'pā - rē - gōp'oo - lōs, Constantine, Greek historian: b. Constantinople 1815; d. Athens 26 April 1891. His father, uncle, brother, and other relatives having been beheaded after the revolution of 1821, he left Turkey and was educated at Odessa under the patronage of the Czar. In 1851 he became professor of Greek history in Athens. He wrote various monographs in Greek history, and collected in 1858 and 1890, and, in Greek, a 'History of the Greek People' (1860-74), which he abridged and rewrote in French under the title 'Histoire de la Civilisation Hellenique' (1878). Both these works aim to show the unity and continuity of Greek history, and especially to rehabilitate the iconoclastic emperors and show the importance of their reigns.

**Papavera'ceæ.** See POPPY.

**Papaw'**, a popular name for several distinct fruits. The papaw of the tropics (*Carica papaya*) is a small palm-like tree of the natural order *Passifloraceæ*. It has usually an unbranched stem, which bears a crest of alternate leaves, in the axils of which are borne racemes of small flowers, followed by yellow fruits sometimes a foot long and containing a large quantity of black seeds. The immature fruits are cooked like squashes, and some persons eat the ripe ones raw. In climates free from frost the plants are grown as a home vegetable or fruit.

Other papaws are members of the genus *Asimina* of the order *Anonaceæ*. The best known of these is probably *A. triloba*, a small tree native to the southern United States, but represented as far west as Kansas and as far north as Michigan and New York. The flowers, which are two inches in diameter and appear with the leaves, are at first green but change to purplish-red with yellow centres. The fruits are dark brown, from two to six inches long, and highly aromatic. As a garden fruit this species seems worth attention; selection should

reduce the size of the large stones and modify the flavor. A few improved varieties have been disseminated. Apart from its fruit the tree is of considerable value for ornamental purposes.

**Papeita**, pā-pā-ē'tē, or **Papeete**, Society Islands, capital of the French islands of Polynesia; on the northeastern coast of the island of Tahiti. It has a good harbor, is the commercial centre of the neighboring islands, and has a large export trade; it is also the most important French naval station in the Pacific. It contains a cathedral, a court-house, and other French government buildings. Pop. 3,000.

**Papeline**. See **POPLIN**.

**Paper** (Fr. *papier*; Lat. *papyrus*; Gr. *πάπυρος*). Paper is a material composed of vegetable fibres formed artificially into thin sheets.

**Papyrus**.—The word paper is derived from papyrus, probably the Egyptian name (with a Greek termination) of a sedge or bulrush of the Nile and marshes of Egypt. The plant was used by the Egyptians to make thin sheets primarily for writing upon, though some were used for wrapping. They stripped the rind from the long stems, exposing the pith which was then cut into thin strips. These were laid out flat side by side, forming a layer upon which other strips were laid at right angles to the first. The two layers were then compressed so as to adhere to each other. Sometimes, perhaps generally, three layers were superposed. The article thus formed was called papyrus.

The existence of papyrus has been traced back to 2400 B.C., and no doubt it then had been in use a long time. In China, and other parts of the world, a similar article, made from rice stalks in practically the same way, is known to have been in use several hundred years B.C., and is supposed to have come down from a time even then remote. The Egyptian papyrus—the material, but not the art—was introduced probably about 325 B.C. into Europe as a consequence of the conquests of Alexander of Macedon and was used there very generally until the 8th century, when, together with parchment, it began to be replaced by paper made quite differently upon a principle which has survived to the present day.

**Early Paper**.—Papyrus is lost sight of in the 12th century. The new paper was of Asiatic origin. Its fundamental difference from papyrus was that the raw material in making paper was first reduced to pulp, that is, the natural structure was broken down so as to separate the component fibres, which were then rearranged to form a lamina or thin sheet. In China, Formosa, Korea, and very likely elsewhere in eastern Asia this principle was used certainly before the Christian era. Though, as Pliny truly says, "the remembrance of past events depends upon paper (papyrus)" with the irony of fate, paper has failed to record its own origin, and much of the early history of the art is left to conjecture. The probable course that paper-making took was from China and other Oriental countries to the eastern extremity of the Mediterranean (Persia and Arabia about 620 A.D.), whence the Saracens carried the practice of the art to Spain after their conquests of that country in the 8th century. The consequent disruption of commercial relations with the Egyp-

tians cut off the supply of papyrus and facilitated the substitution of true paper in Spain and other parts of Europe. Paper from Damascus had at about the same time found its way into eastern Europe, but the first paper mill in Europe was established by the Saracens in Spain. The spread of the industry throughout Europe was slow, and its route and early development cannot be surely traced. Italy had its mills soon after Spain; France first learned to make paper in 1189; in Germany the first mill was built in 1390, while for the beginning of paper-making in England 1330 is given as an uncertain date. The western hemisphere was reached in 1690, when a mill was erected at Germantown, Pa., by William Rittenhouse. It is a curious sequel that to-day there is absolutely no paper made in Egypt, which supplied the civilized world for so many centuries with papyrus, and that the Chinese and other Orientals who contributed the fundamental principles of modern paper-making have made little or no progress themselves in developing the art. Although they have characteristically adopted Western machinery to a limited extent, they still in the main cling to archaic methods of making paper, which are of slight commercial importance. The industry is now practically confined to Europe and North America.

**Materials**.—All vegetable growths consist of (1) cells or fibres mainly composed of cellulose ( $C_6H_{10}O_5$ ) and (2) various intercellular matters such as resins, etc. Paper is made of the fibres with more or less of the intercellular matter adhering to them according to the treatment undergone. As early as 156 B.C. the Chinese made pulp from the small branches of the mulberry tree, various barks, bamboo, leaves, etc. In Korea the paper-mulberry was chiefly used and the Japanese having begun to cultivate this tree made paper from it about 610 A.D. It is still to-day almost the only raw material used by them. The portion used is the inside bark. It appears that the Saracens used cotton for paper from a very early time and were probably the first to find that old cloth fabrics also answered the purpose very well. In Spain flax was the first material used, and then cotton. The paper imported into Europe from Damascus was likewise made of cotton; 1085 is set as the date when "rags" were first used in Spain and 1100 for the first appearance of linen paper. The first paper made in America was "rag" paper. From the time rags began to be used in Europe, they rapidly displaced other materials on account of the economy of the double use of the fibre. Rags held sway in the paper industry for many centuries, but not entirely to the exclusion of numerous other materials. Esparto (q.v.), which is a Spanish grass, containing an especially good fibre, and other similar grasses as well as straw, have long been used. In 1765 Schaeffer of Ranslon published a book printed on 60 varieties of paper made from as many different materials. Somewhat more than 100 years ago, under the stimulus of greater demand, the substitution of machinery for manual labor and the development, of chemistry, attention was directed afresh to the use of fibre derived directly from the original growth as a substitute for rags. An impetus

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was given to the manufacture of paper from straw (first used about 1800), which has made it until recently an important factor in paper-making. In 1719 Reaumur first suggested the use of wood. Sporadic experiments to this end were made, but without noteworthy results until finally they culminated in the present mechanical and chemical processes of producing pulp from wood. Since it has been demonstrated that paper can be made from almost any kind of vegetable fibre, it only remains to discover new methods of treatment or improvements in old methods which will render more varieties of fibres commercially available. It is thus merely a question of cost of material and of conversion. At the present time the principal materials used are spruce and other conifers, poplar and similar woods, cotton and linen rags, jute, straw, hemp, esparto, old papers and other waste materials. In the United States the use of straw and rags is relatively, if not absolutely, diminishing and of woods increasing. For many years vast quantities of rags were imported into the United States from various parts of the world, notably Egypt, China, and Japan, but the domestic supply now suffices. Wood fibres, originally substituted for rags, straw, and other materials in the cheaper or lower grades of paper, have gradually, as methods of treatment improved, become suitable for better grades. The finest papers, however, are still made from linen rags.

*Processes of Manufacture.*—Leaving out of consideration papyrus and rice paper, the reduction of the raw materials to pulp has always been a preliminary to making the paper. So far as we know this was done by the Chinese and kindred nations, the first pulp-makers, by beating the raw materials into a pulpy mass, with simple hand tools. They also at a very early date disintegrated the materials by either soaking them or boiling them in lyes. They thus originated two processes of making pulp which, though much modified, are still in vogue. As the Japanese and Chinese still depend principally upon hand implements for macerating the raw materials, we must look elsewhere for the earliest application of machinery for this purpose. Whether paper-makers used machinery before the introduction of rags is not clear, but it is highly probable that they did. Certainly machines driven by water power were in use soon after the adoption of rags. They were a sort of trip hammer which pounded the rags into pulp. In the first mill erected in Germany in 1390, such a machine driven by water power was used to prepare rags. Water power was also used in a paper mill in Tuscany some time in the same century. Whether at first rags were "cooked" before being beaten is not certain, but it was not long before it became customary to so treat them. The fabrics were first weakened with caustic and then macerated in a "beating engine." The "Hollander engine," the precursor of almost all modern types, was invented in 1750, and essentially as originally designed is still used very generally. It consists of a rapidly revolving iron "roll" mounted in an oval-shaped tub and set with dull steel "blades." The roll revolves over a "bed plate" and draws the "stock" through between the roll and plate. When straw, esparto and other similar materials came into use, they were likewise reduced to a pulpy

state by chemical treatment, but the "beating" became of secondary importance. With the introduction of wood there have been evolved from fundamental principles already described various methods of reduction, classed as either (a) mechanical; or (b) chemical.

The conversion of pulp into paper, based always on the same principle, may be divided into two processes: (1) handmaking, (2) machine making. The "hand" process came into existence at a very early period and still survives in some countries, notably in Japan. But the output of hand-made paper is very limited, except in Oriental countries where, in contrast with the high development of the art elsewhere, the adherence for centuries to this antiquated process is a striking mark of their backward civilization. The method of making paper by hand has remained practically the same as it was more than two thousand years ago. The pulp is diluted with water in a vat in which is immersed a "mold" or rectangular frame, on the top side of which are stretched parallel wires near together with others at right angles (woven wire cloth is now generally used). Upon this "mold" is tightly held a "deckle" or wooden frame. On withdrawing the "mold" from the vat in a horizontal position, the water within the deckle drains off, leaving the wires coated with fibres, the operator meanwhile shaking the mold so as to evenly distribute them. The film of fibres or paper is then stripped from the mold and laid upon a felt. Paper and felt are piled alternating, forming a "post," which is then pressed to extract the water. The greatest advance, in the history of paper-making, was made when toward the close of the 18th century a machine driven by power and making paper continuously was substituted for this single-sheet hand process. Modern paper making may be considered to date from that time. Roberts, a Frenchman, working in a hand paper mill in France, is credited with this invention, and in 1799 his machine was installed by François Didot at Essone, France. In 1803, Fourdrinier and Donkin introduced essentially the same machine into England, where it was put into successful operation in the following year. That machine, in principle the same as those in universal use to-day, is known by the name of Fourdrinier, the maker, but not the inventor. It multiplied the productive capacity of labor enormously. Although a continuous web of paper was produced it was invariably cut into sheets, for it was nearly 100 years before the invention of the web printing-press created a demand for paper in the form of rolls. Second only in importance to Roberts' invention was that of Dickenson, an English paper-maker, who, in 1809, invented the "cylinder" machine, a modification of the "Fourdrinier," which has played an important part in the manufacture of wrappings, paper boards and generally the coarser grades, while the Fourdrinier is supreme in the book, news and writing paper fields. The machines in use in the United States were:

In 1872, Fourdrinier 299,	Cylinder 689.
In 1900, " 663,	" 569.

Great improvements have been made not only in the paper machines proper, but in the other machinery used in pulp and paper-making, and the use of raw materials has been revolutionized



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so that paper-making has as a whole made an enormous stride since the day of Roberts, but still his time must be regarded as an epoch in the history of the industry.

*Growth of the Industry.*—The earliest use of paper was for writing purposes. As the art of writing was for so many centuries confined to a small portion of the world's population, and as few copies of books were made, the consumption of paper must have been very limited compared with many other commodities. But the invention of printing which led to the manifold production of books gave a great stimulus to the industry. It is probable that the use of paper for numerous mechanical and practical purposes is of comparatively modern origin except that it has always been used more or less for wrapping. But paper was too much of a luxury to be used freely for wrapping until recent times and even now, for example, in Italy as a usual thing frugal shop-keepers do not furnish wrapping paper, and not uncommonly the buyer, if he wishes his parcel wrapped, takes with him the paper, usually an old newspaper or sheets from a child's copy book; these he uses as long as they will hold together. There has been at all times a reciprocal relation between paper-making and many other arts and industries, progress on the one side stimulating progress on the other. Thus, for example, improvements in printing have not failed to meet a response from the paper-maker with cheaper product. The use of web presses for printing newspapers has stimulated improvements in the process of making paper which reduced its cost and the reduction in price in turn has been a very important factor in the growth of the printing and publishing industries.

The production of paper is now centred principally in the United States, England, France, Austria-Hungary, Belgium, Holland, and Scandinavia. These countries lead both in the methods of manufacture and the quantity of output. In general there is a striking relation between the intelligence and progressiveness of a country and the quantity of paper consumed. It follows as a corollary, that the United States has a greater per capita production than any other country. The total number of paper mills in the world is between 4,000 and 5,000, including numerous small establishments in China, Japan, and other Oriental countries, where paper is made mostly by hand, but no reliable statistics exist to show the total production of the world. A rough estimate would make the world's production upward of 9,000,000 tons annually. This is approximately three times the world's annual growth of cotton; the significance of this comparison is that it indicates the insufficiency of rags as raw material and the importance of the inventions which have led to so general a use of wood pulp.

*Classification.*—The commercial classification of paper is based primarily upon the different uses to which it is to be put. Logically the different kinds of paper fall into two groups: (1) paper for recording and (2) paper for mechanical or practical purposes. The first group may be subdivided into (a) "writing" paper, this being on the whole the best in quality is accordingly known as "fine" paper, and (b) "printing" papers, again subdivided into "book" and "news."

The second group includes many varieties, the most important being "wrapping," but this, too, has many subdivisions. The classification of paper adopted by the United States census of 1900 follows pretty closely this logical idea and is as follows: (1) "news," in "rolls" and "sheets"; (2) "book," including "cover," "plate," "lithograph," "map," "wood cut," "cardboard," "bristol board," etc., (3) "fine," including "writing," "ledger," etc., (4) "wrapping," including "manila" (made from rope or directly from jute, hemp and other strong fibres), (5) "straw" (at one time used for printing, but now relegated principally to the wrapping board classes), (6) "bogus manilas" (so called from their being imitations of genuine manilas, although composed of wood fibres), (7) "boards," including "binder boards" (used for binding books), "pulp boards," "straw boards," "news boards" (made from old newspapers). "Boards" in general are used for making paper boxes and for many other purposes; finally (8) "miscellaneous," including "tissues," "blotting," "building," "roofing," "carpet lining," "hanging" (wall), etc.

News paper, in countries where suitable woods are plentiful, is generally made from wood pulp. Elsewhere rags, straw, esparto, and other materials are used. The highest grades of book paper are made from linen and cotton rags, but a very large and increasing percentage is made from wood pulp, principally chemical pulp, mechanical or ground wood pulp being used only in the cheaper grades. The two principal varieties of chemical pulp, namely, "sulphite" and "soda," are both used extensively in book papers. The best quality of "fine" papers are made of linen rags, wood pulp and cotton rags being used for the lower grades. Wrapping papers are made of all kinds of fibres, but in this country rags for this purpose have been practically abandoned. Boards are made of wood pulp, straw, old newspapers and other fibrous waste materials, according to the particular purposes for which they are intended. Tissue papers are made from a variety of fibres ranging from the manila hemp to wood pulp. The papers produced in other countries comprise all those enumerated above and many other varieties or "specialties." Austria and Germany are remarkable in this respect.

Referring to the United States, the value of paper produced for writing, printing and similar purposes compared with that produced for mechanical purposes such as wrapping, boards, etc., is not far from equal. The tonnage of news paper exceeds the tonnage of book paper and fine paper combined and is upward of one fourth of all kinds of paper made.

Pulp is used for many mechanical purposes, but there is an erroneous impression as to the extent to which it is so used. It is generally not formed into paper, but converted directly into various articles. Such articles are, therefore, not to be regarded as paper. So-called paper car wheels, for instance, are steel shells packed with "pulp."

*Sizes.*—In the United States, if not elsewhere, the paper-maker has so conformed to the various demands of the consumer that standard sizes which were originally adhered to, are, except in the case of writing papers, almost obscured by the great variety of special sizes. Four fifths of the news paper is in rolls varying

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in length of roll (that is, width of web or sheet) usually from 30 inches to 75 and, in diameter, from two to three feet. The International Paper Company exhibited at the Buffalo Exposition the largest roll ever made, being 152 inches in length and weighing 4,000 pounds, and the sheet unrolled would reach six miles. Some of the common standard sizes of news sheets are, in inches, 20 x 30, 24 x 38, 30 x 40, 32 x 44, etc. The sheets are put up in bundles generally of two reams of either 480 or 500 sheets to the ream and are either "folded" in quires or put up "flat" or "lapped" (one ream dovetailing into the other). Book paper is generally in sheets, although the use of web presses requiring rolls, is extending to book and magazine publishing. The sheet sizes are many of them the same as news paper. The principal sizes of fine papers are 16 x 21 (demy), 17 x 22 (folio) 17 x 28 (double cap), 19 x 24 (royal), and 22 x 34 (double folio). Wrapping paper and boards are furnished in both standard and special sizes. In recent years, wrapping paper to a considerable extent has been prepared for the market in what are called "counter rolls."

**Modern Conditions.**—If we take the United States as a type the most important factors in paper-making are raw materials (spruce and poplar wood, rags, straw and old papers), water power, and fuel. About three quarters of the total tonnage of paper made in the United States is composed of wood pulp. The percentage made from rags is very small, not more than 5 per cent or 6 per cent, but the value of the rags used in the last census year was \$6,595,000 as compared with \$9,837,000, the value of the wood used, demonstrating that rags are used chiefly in the highest grades of paper. Water power is not only indispensable for making ground wood pulp but is generally relied upon to drive the beating engines and other heavy machinery. (United States census 1900—765,000 H. P.) Coal is required principally for producing heat to dry the paper, but also for additional power.

Other important conditions affecting the production of paper are the existence of good transportation facilities and the proximity of large markets. All these factors combine not only to put the United States at the head of paper-making but to concentrate the industry to a considerable extent in the northern tier of States. New York, Massachusetts, Maine, Pennsylvania and Wisconsin lead in the order named, in the value of the output of their mills. An advantage which American ingenuity itself has created is the superiority of its paper machinery, especially in point of capacity; American machinery being, as a rule, larger and operated at greater speed than that of other countries. It is this fact that more than compensates for the much higher scale of wages prevailing here than in any other paper-producing country, even after due allowance has been made for the superior character of American workmanship. The machine tender, for example, who receives \$3.00 and upward a day in the United States, in England receives \$1.66, in Germany \$0.75, while in Italy, Scandinavia, and other countries even less. The exporting of American paper machinery has a decided tendency to neutralize the advantage that the United States paper-maker might have if it could be kept for his own exclusive use.

**Present Process of Manufacture.**—The United States will again serve as a type, for while other countries may excel in certain specialties and refinements, the United States leads in the production of the most important grades of paper. The underlying principle in making all grades of paper is to first reduce the raw materials to pulp, to dilute the pulp so as to perfectly disintegrate the fibres and then to re-assemble them by quickly getting rid of the water and depositing the fibres in the form of a sheet. All materials are reduced to pulp mechanically or chemically. Beating and grinding are the mechanical methods. Beating is applied to rags (after cooking), to old papers, and other waste materials.

**Ground Wood Pulp.**—Grinding is confined to woods. Spruce is used chiefly, though other kinds of conifers are used to a limited but increasing extent. Trees upward of 10 or 12 inches in diameter are felled and transported to the pulp mill either (1) in logs or (2) sawed into lengths of usually four or two feet. Sometimes the wood is peeled in the forests but usually it has the bark removed by a "barker" or "rossing machine." The "blocks" of wood two feet in length are brought into contact with a rapidly revolving vertical disk set with knives at an angle to the surface which shave off the bark as the block is rotated before them. Imperfections such as knots, gum seams and decayed portions, if left after barking, are removed by placing the blocks under a "splitter" which splits off the imperfect portions, but usually the block is suitable for "grinding" as it comes from the barker. It is then placed in the "grinder." This consists of a grindstone set upon a shaft directly driven by a water wheel at great speed. The "stone" is enclosed in a steel case with openings or "pockets" at two or three points in the circumference. The wood being placed in these pockets, is forced by hydraulic pressure "side-on" against the surface of the revolving stone. The object is to disintegrate the wood by a sort of tearing rather than cutting action and upon the condition of the stone, the relative speed and pressure, the quality of the pulp mainly depends. A continuous flow of water on the stone prevents charring of the wood and carries away the fibrous particles as they are rapidly separated from the block. The continuous use of from 75 to 100 horse-power is required to produce a ton of pulp in 24 hours. Sometimes as much as 500 horse-power is applied to one stone. The pulp-laden streams of water from the different grinders are then converged and directed upon a series of "screens" which strain therefrom the coarse particles. If the pulp is to be used at once for making paper in the same establishment, it either goes to the "reducers" which withdraw a large quantity of the water, thereby increasing the consistency of the liquid to a pulpy mass, which is then stored in tanks; or, if it is to be transported or stored for future use, it passes from the screens in the same diluted condition to the "presses." The press consists of a revolving drum covered with a very fine wire mesh which permits the water to be drawn through and discharged while the pulp fibres are deposited on its surface. The thin film of pulp being allowed to build up layer on layer is removed as fast as it reaches a suit-

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able thickness for handling. The sheets of pulp thus formed, containing water and pulp in about equal proportions, are folded up into "laps" averaging 25 pounds in weight each, and are then in convenient shape for handling and transporting.

**Sulphite Pulp.**—The two most important chemical processes for making pulp are the "sulphite" process and the "soda" process, both used principally in reducing wood to pulp, although the soda process in a somewhat modified form is used in treating straw, if intended for high grade papers, and in England esparto. In the sulphite process the wood is prepared as for the ground wood process. The prepared blocks of pulp wood are then "fed" lengthwise to a "chipper" or set of knives which, revolving with great speed, transform the wood into small "chips." The purpose of this is to facilitate the permeation of the wood by the "liquor" in which the chips next are immersed in the "digester." The digester is a massive upright stationary steel vessel (of an average capacity of 8 or 9 tons of pulp) usually lined with cement or other material unaffected by acids. The liquor with which the digester is filled after the chipped wood is introduced is a solution of sulphurous acid ( $H_2SO_3$ ). The making of this liquor is an important feature of this process as upon its correct chemical composition the quality of the pulp largely depends. It is made by passing the fumes of sulphur which is burned in especially designed "retort furnaces" either into a "tower" filled with limestone over which water is trickling or through "tanks" containing lime in solution with water. The result in both cases is the formation of a solution containing a bi-sulphite. Hence, the name "sulphite" pulp. After the digester is filled with chips and liquor it is closed hermetically, steam is forced in under pressure of 80 to 100 pounds and the chips are allowed to "cook" from 8 to 12 hours. Then the contents are discharged into "blow-pits" or vats beneath and washed by a stream of water which removes all traces of the liquor they have been cooked in. The pulpy mass is then screened and pressed and put up in laps, similarly to the manner in which ground wood pulp is treated. In the process of "cooking" the intercellular portions of the wood are dissolved and the nearly pure cellulose fibre remains. Much care is necessary to stop the cooking at just the right point so as to leave the fibre properly freed from the surrounding substances, but unimpaired in strength. The bulk of the wood is reduced nearly one half, whereas in the ground wood process, both the cellulose and intercellular matter are preserved and the prepared wood (dry) and pulp are nearly the same, weight for weight, the only loss being in the mechanical process of removing the imperfectly ground wood. For high grades of paper "sulphite" is bleached.

**The Soda Process.**—For this purpose poplar is mostly used, although many similar woods may be used. The wood is prepared in chips as already described and cooked in digesters, generally stationary, containing a solution of caustic soda. The pulp is discharged into iron tanks and "washed" thoroughly—to remove the freed organic matter and the alkali. The washing is so done as to use a minimum quantity of fresh

water, as the "recovery" of the soda from the liquor used in washing is an important feature of this process. It is so successfully performed that in some mills as high as 90 per cent is recovered. The liquor is first "evaporated" under a partial vacuum by steam until it is of about the fluidity of melted pitch. In this state it passes into a revolving drum-like "furnace" where combustion is set up by means of a flame from an adjoining fire-box, burning wood or coal, which coming in contact with the pitchy liquor, ignites it. The residue is a "black ash" which is then causticized with lime and becomes suitable for use again. Soda-pulp, partly on account of the nature of the wood itself and partly on account of the drastic treatment, is of a much softer quality than sulphite, has a shorter fibre and therefore less strength and the yield is less. It requires bleaching to fit it for use in all except dark colored papers, as without bleaching it is of a brownish color.

**Rags.**—Cotton rags, consisting as they do of the nearly pure cellulose fibre and linen rags, being composed of fibres which have already undergone a treatment of maceration and "retting" to remove the intercellular matter, have only to be "cleaned" and separated into the individual fibres to prepare them for paper-making proper. The various preparatory steps are threshing, picking, sorting, and cutting into small pieces. These pieces are next boiled from 12 to 18 hours under steam pressure in a weak solution of alkali (milk of lime), contained in revolving boilers, usually horizontal, called "rotaries." This "kills" the colors and "starts" the grease and dirt so that when the cooked stock is placed in a "washer," the impurities are readily separated, leaving the fibres quite clean. It is necessary, however, if the stock is to be used for high-class papers, to bleach them with some compound of chlorine. The "half stuff" is then let down into vats or "drainers" where the liquor is allowed to drain off.

**Converting the Pulp into Paper.**—Paper-making, in the restricted sense, begins with assembling the pulps and other materials, and mixing them thoroughly at the same time further disintegrating the fibres. This is done in a "beater" or oval-shaped tub of an average capacity of about 1,000 pounds of paper in which revolves a horizontal roll with steel blades on the surface, running parallel with the shaft. As the roll revolves the blades draw the "stock" between their edges and a "bed plate" of steel, thus "brushing out" or separating the fibres. It will suffice from this point to describe the process of making news paper which is essentially the same as in all kinds of paper with certain modifications of which the most important will be noted. The beater is "furnished" with sulphite pulp and ground wood pulp in the proportion of about one to three. Other kinds of paper have their appropriate "furnish." Sometimes a small percentage of clay or other mineral "filler" is used, the quantity varying with the kind of paper to be made. The filler improves the color, surface and "feel." "Size" which is rosin in a saponified form is added and has the effect in the final drying process of forming a kind of "varnish," rendering the paper less absorbent. It also helps "fix" or hold the "filler," increasing the strength. Coloring matter, which in news paper is generally

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"aniline blue" is put in, usually in solution. Alum is added as a mordant to "set" the color and also to "free" the resin in the size and "set" or deposit it. After a thorough mixing in the beater the pulpy mass or "stock" is usually passed through a "refining engine," the most common type of which is known as the "Jordan." The purpose of the Jordan is to supplement the brushing out and mixing which has already occurred in the "beater" and to shorten the fibres if desired. It consists of a cone which revolves in a stationary conical case, the outer surface of the cone and inner surface of the case being set with numerous blades, the two sets of which can be made to approach as near each other as desired. The relative position of the blades determines the length of the stock which continuously passes between them. After leaving the "Jordan," the stock is "screened" and then pumped upon the paper machine proper, having been thinned or diluted at various points of its passage so that when it comes upon the machine, it behaves in all respects like an absolute fluid. The Fourdrinier machine on which all news paper is made, may be divided into the "wet" part and the "drying" part. On the wet part the paper is "formed" and given a consistency which properly entitles it thereafter to be called paper, the rest of the process consisting in still further increasing its consistency, drying it, giving it surface, etc. The liquefied stock, having come to the machine, flows from the "head box" through a wide aperture or mouth over an "apron" and upon an endless horizontal wire cloth moving forward continuously. The relative rate of "flow" and "speed" of the machine determine the thickness or weight of the paper. The spread of the stock sideways is limited by two endless rubber straps called "deckles," one at each edge of the "wire." The water immediately begins to drain off through the wire and the fibres to deposit upon its surface. Through various devices so much of the water is removed that when the film of fibres reaches the point where the wire returns on its backward course, it is sufficiently compact or "felted" to be separated from the wire and conveyed by "felts" to and through the "presses" of which there are two or three. The presses are massive rolls in pairs, the paper supported by woolen endless "felts" passing between them. After this the paper readily carries itself and passing over a short gap, it enters the "dryers." They are cast-iron cylinders from 20 to 30 in number varying on different machines from three to four feet in diameter, arranged in two horizontal tiers, one above the other. The paper passes partially around each dryer, going alternately from one tier to another, conveyed by endless canvases called "dryer felts," which serve to press the paper against the surface of the dryers heated by a constant passage of steam inside. Returning to the first formation of the sheet it is interesting to note the variety of means employed for disposing in the quickest possible time and within the most limited space, of the vast amount of water in which the fibre is at first suspended. First, gravitation draws the water through the wire cloth. This is facilitated by a large number of small "table" rolls immediately under and supporting the upper part of the wire which, as they revolve, tend by capillary attraction to

carry away the water and thus hasten its flow through the wire. The "shake" which gives to the wire a lateral movement back and forth, intended to distribute the fibres evenly and prevent their arranging themselves longitudinally or in the direction of the flow, tends also to hasten the draining off of the water. The wire, carrying the paper, passes over a series of "suction boxes" which have perforated tops and are subject to the action of exhaust pumps. The water is drawn through the wire and away through the suction boxes. Before the paper leaves the wire, it passes under a heavy "couch roll" which both presses out the water and by reason of being covered with a "jacket" of felt with exceedingly long nap, constantly absorbs water of which it is ingeniously rid by a "guard." The presses act in the same way as the couch roll, pressing out and absorbing more water. But notwithstanding all these devices, the paper reaches the dryers with usually not to exceed 30 per cent of stock in the sheet, the rest being water which has to be dried out as the paper passes over the dryers at the rate often of 500 feet a minute. From the dryers, it goes through the "calenders," a series of chilled iron rolls with polished surfaces arranged in a "stack," the paper going in at the top and passing out at the bottom to the "reel." This is practically an ironing process and by the regulation of the pressure of these calender rolls the requisite amount of "surface" is given to the paper. Book and fine papers are often "supercalendered" or passed through a second stack of calenders after the paper has been taken from the paper machine. When the paper leaves the calenders and is reeled, it may be considered to be made. All that remains is to trim off the rough or "deckle edges" on the "slitter" where as it unwinds from the reel, it passes between rapidly revolving knife-like disks. If it is desired to divide the width of the sheet it is done at this point by adding one or more sets of "slitter blades" according to the number of divisions of the sheet desired. Finally comes the "winder." If the paper is intended to be marketed in rolls it is wound on either an iron "core" or as is now more usually the case, on a core made from heavy tough paper, until the desired diameter is reached, when the rolls are taken away to the "finishing" section where they are "finished," that is, wrapped in stout paper securely pasted and marked. They are then ready for shipment. "Sheet" paper was formerly cut into sheets by a "cutter" attached to the paper machine, but as the speed of the machines has increased this practice has been almost entirely abandoned and now it is usual to run the paper into rolls which are taken to the finishing section and cut into sheets on a cutter, the sheets then being "counted" and done up into "bundles."

*Machine or Tub Sizing.*—Fine papers, besides sometimes being "sized" in the beater, are usually sized on the paper machine, the web passing through a "tub" of some heated gelatinous mixture ("animal size"). The paper is either dried (1) wholly on the machine or (2) partially, and then after being cut into sheets is hung in "lofts" to complete the drying.

*Water Marks.*—Water marks are produced by a "dandy," a skeleton cylindrical roll covered with wire cloth, mounted over the "wire" be-

## PAPER BIRCH—PAPER INDUSTRY IN AMERICA

tween the first and second suction boxes, and resting on the web of paper. The design for the water mark is raised on the surface of the dandy and impresses itself on the paper. "Laid" paper is made with a dandy so covered with wires as to make an impression of parallel lines running lengthwise about an inch apart crossed at right angles by lines quite close together. The dandy also helps "form" the paper.

**Coated Papers.**—To meet the requirements of certain kinds of presswork, some papers are "coated" on one or both sides with china clay or other mineral substance, which gives an exceedingly smooth surface without the hardness of supercalendered papers.

**Cylinder Machines.**—The distinguishing feature is the use of a drum covered with wire (instead of the horizontal endless wire of the "Fourdrinier") which operates the same as the pulp press, already described. Several cylinders can be used on the same machine, each making a separate web, all of which are brought together before passing into the presses, thus making paper of as many "plies" as there are cylinders. This principle is taken advantage of to make composite papers, one ply being of one quality, another of another, and also to make very heavy papers.

**Combinations.**—The most striking of recent changes in the industry in the United States is the consolidation of many mills under one ownership and management. Already a majority of the "news," "writing," and "boards" mills have thus come together, forming the largest companies in the world in their respective branches. There is a national organization of paper manufacturers of the United States known as the American Paper and Pulp Association, founded in 1878.

**Exports.**—The export business of the United States was insignificant until 1878 when the "paper and manufactures thereof" exported amounted to about \$1,000,000. For the year ending June 1910, the amount was more than \$8,000,000. The exports consist largely of news paper which goes principally to England and Australia.

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**Paper-birch.** See BIRCH.

**Paper Hangings.** See WALL-PAPER.

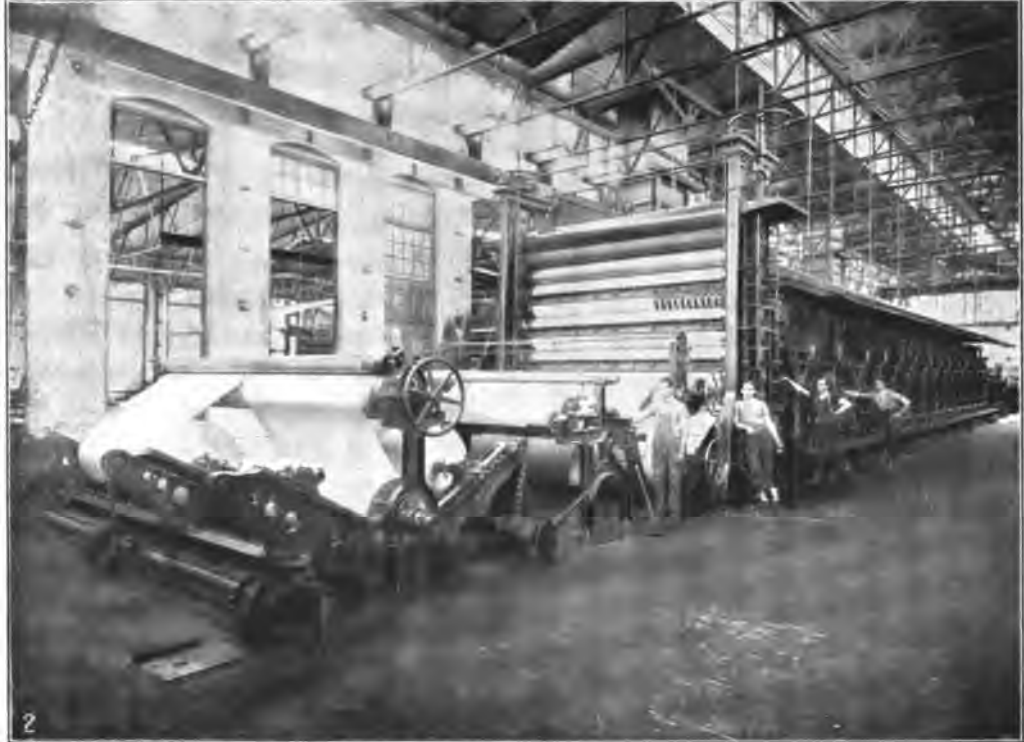
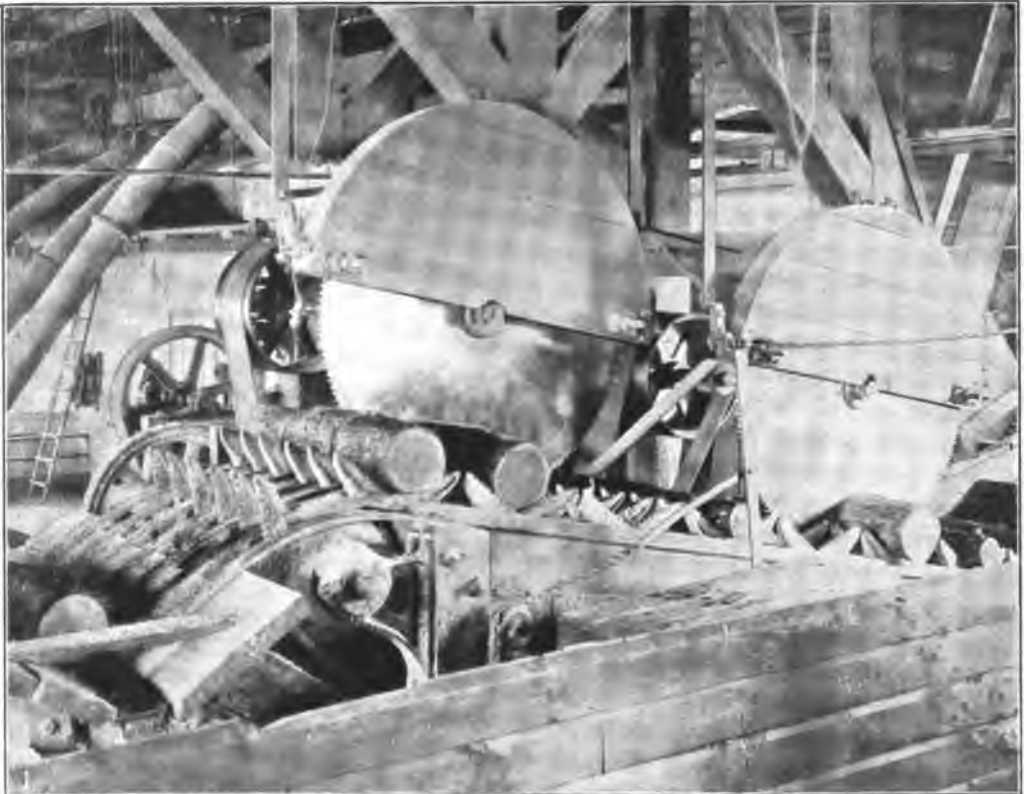
**Paper Industry in America.** If the paper-making industry is not one of the largest it is, at least, one of the oldest of the American industries, for it was as early as 1690 that William

Rittinghuysen, an experienced papermaker from Broich, in Holland, entered into partnership with William Bradford, the printer, and together they opened the first paper mill ever established on American soil. It was located on a creek since known as Paper-Mill Run, conveniently near Philadelphia, and here a very fair quality of paper was manufactured out of pulp made from the rags of the home-grown flax. As the colonists had no other paper mill for fully twenty years, when William de Wees, a brother-in-law of Rittinghuysen's son, opened a rival establishment in close proximity to the first one, the enterprise was a profitable one, in spite of the fact that the making of paper by hand—the only method known in those days—was a laborious and costly process. In fact, this primitive system was in vogue in America until 1756, when the first pulp-engine to be introduced in this country was imported from Holland.

As the use of the new pulp-engine materially reduced the cost of production the demand for paper naturally increased in the colonies, and, within less than fifteen years, there were fully 40 mills in various parts of Pennsylvania, Delaware, and New Jersey, that were turning out an aggregate annual product valued at more than \$500,000. In 1794, another large mill was established at Troy, N. Y., by Websters, Ensign & Seymour, and, during the same year, a mill for the manufacture of coarse wrapping paper from the bark of the basswood-tree was opened at Fairhaven, Vt., by Matthew Lyon. As this was the first establishment in the United States to attempt to make use of anything except rags for pulp, the enterprise attracted no little attention.

In the ordinary paper mills, however, the method of manufacture was still a crude process. To make paper the pulp was floated in vats, at the side of which stood the workmen, mold in hand. This mold was of wire cloth, around the outer edges of which a rim was formed by superimposing a thin frame called a "deckle," which prevented the pulp from flowing off, and left the water no other escape than through the bottom of the mold. Into this the pulp was dipped and, as the water drained away, the pulp was left in the form of a thin layer covering the bottom of the mold. At this point it was given to another man—a workman known as the "coucher"—whose duty it was to remove the mold. This was done by the application of a piece of felt to which the pulp adhered in the form of a thin sheet; a second piece of felt was then placed on top of this; to this felt another pulp-mold was applied, and this process was continued until the pile of alternate layers of pulp and felt had attained the requisite height. From this pile, or "post," as it was called, all the water was thoroughly expressed, and the pulp, separated from the felt, was pressed, and hung upon the "tribbles," or lines in the drying room. This portion of the process completed, the sheets were still rough and somewhat like blotting-paper, so it was necessary to dip them in size, and to press and dry them again, before they assumed the character of a finished product. Laborious as this method was, it was the only process known until after the beginning of the 19th century.

The first marked improvement in the art of paper-making came with the introduction of the Fourdrinier machine. This invention was origi-



1. Cutting logs into Pulp wood lengths.

2. Fourdrinier Paper Machine





## PAPER INDUSTRY IN AMERICA

nally conceived by Louis Robert, a man employed as an ordinary workman in Francois Didot's paper-mill, at Essone, France. In 1799 he secured a patent for a process of making paper by an endless web-machine, but, as he was financially unable to carry such an idea into effect, he sold his rights to Leger Didot, who took the patent to London. It was nearly four years, however, before he was able to interest the necessary amount of capital, but in 1804 he succeeded in persuading two brothers, Henry and Sealy Fourdrinier, both wealthy London stationers, of the practicability of the scheme, and he finally transferred his interests in the invention to them. As the result, the machine has since borne their name.

In the meantime the paper-making industry in the United States had enjoyed steady growth. By 1810 the number of mills had increased to 185, and their annual product was valued at more than \$800,000. Already the demand for rags had become so great that the manufacturers, finding the domestic supply utterly insufficient, had commenced to import them. In 1817, the first power-mill in the country began operations at Pittsburg, Pa., and, about the same time, Thomas Gilpin & Co., of Wilmington, Del., commenced to make paper by machinery. These machines, however, were of American invention.

Although the Fourdrinier machine was in use in England as early as 1806, it was not introduced in the United States until 1820. That it had revolutionized the making of paper there could be no doubt. By its use a seven-vat mill which had previously been operated at an annual expense of \$13,000, could now be run for a sum not in excess of \$3,600, and yet, while the American manufacturers knew all these facts, the cost of such machines was so great that they hesitated to introduce them. They consisted of an endless web of wire cloth. As it revolved a stream of liquid pulp flowed over it evenly, the precipitation of the water through the cloth being so nicely adjusted that it was completed at the very moment in which the pulp-sheet met an endless belt of felt, which not only removed the pulp from the wire, but bore it on, through the heavy metal rolls which pressed it, separated it from the felt, and passed it over the steam heated cylinders upon which it was dried, expelling it, at last, in a condition ready to be polished and cut into sheets.

As rag pulp is still used in the making of expensive grades of paper, the preliminary process to which rags are subjected is interesting. First cleansed and softened by being boiled in a strong lye of caustic alkali or lime, the rags are then placed in a washing machine, in which a heavy cylinder, with knives attached, partially macerates them. Everything except the vegetable fibre itself is then removed, a solution of bleaching powders is added, and the mass is left in stone vats to bleach as long as may be necessary. This process completed, the substance left is taken to the beating engines, where, after it has been thoroughly washed with water to remove all trace of the chlorine, it is reduced to pulp and transferred to the Fourdrinier machine. Of course, during the past hundred years, so many changes have been made in this mechanism, so many modifications and improvements, that it is difficult to realize that it bears any relationship to the original invention. In spite

of this, however, the process is practically the same, although, to-day, the pulp that goes in at one end comes out at the other a finished product.

In 1809, an English manufacturer named Dickinson perfected another invention for making paper. It was called a "cylinder-machine," and differed from the prior invention by being fitted with a hollow, perforated, wire-gauze-covered cylinder, which operated directly in the pulp-vat by drawing out the water and leaving the sheets of pulp on the gauze, by which it was conveyed to the felt belt, and, thus, through the couching-rolls. In other respects it followed the principles of the Fourdrinier machine.

The American invention, which was first used in 1817, was of similar construction, but no other machine was known in this country until 1820, when the Gilpins imported machinery for making paper. The story of the next ten years is one of invention and improvement. In 1822, John Ames, of Springfield, Mass., invented a new cylinder-machine, and, in 1829, this invention had been so improved that its general use was assured. It was in this year that straw and grass were first used in making paper by Shryock, of Philadelphia; in 1830, the manufacture of Fourdrinier machines was commenced in Connecticut by Phelps & Spofford, and, in 1831, the discovery of the value of chlorine in cleansing pulp-fibre permitted the use of hitherto unavailable substances for paper stock. By 1850, there were only five mills in this country that still clung to the hand-made process of paper-making and paper-machines had been so greatly improved that laid paper was, at last, produced by that method.

The general use of straw paper began in 1857. Some three years previous to this time, a Frenchman named A. C. Mellier, had succeeded in converting several vegetable fibres, notably straw, into pulp which he believed would be suitable for use in the manufacture of paper. The process, which has since borne his name, was neither a difficult nor a costly one. The straw was first thoroughly soaked, and, after it had been cleansed, it was boiled, at a temperature of not less than 310° F., in a solution of about four per cent. of caustic soda. Although Mellier peddled his idea from one end of the country to the other, the big manufacturers of paper did not seem to consider the scheme a practicable one, and three years, therefore, elapsed before he was able to persuade anybody to invest their money in his project. The man who finally undertook to manufacture paper by this process was J. B. Palser, a member of the firm of Howland & Palser, but the factory which they established at Fort Edward, N. Y., for the express purpose of carrying Mellier's idea into effect proved an excellent investment. In 1859, Palser himself patented some important improvements upon the process, and from that day straw paper became one of the staple grades of the market. One of the direct effects of this innovation in the paper industry was the rise in price for rye straw from \$6 to \$20 per ton. Of course, straw paper was by no means a perfect product and was not entirely suited to many of the purposes for which it was used. Thus, for example, the silicious character of the straw was shown in the hard, brittle surface of the paper, a factor which alone represented a great disadvantage, especially from the printer's point of view, for such paper wore out type about

## PAPER MONEY — PAPIER-MACHE

four times as fast as the softer surfaced papers had done. Moreover, the glassy surface of the paper did not tend to durability, and yet, in spite of all these objectionable features, nearly all the newspapers were printed upon it, even until after the Civil War, but no great regret was felt when it was finally superseded by wood-pulp paper.

The quarter of a century that passed between 1830 and 1855 was largely an experimental period in the history of paper-making. During this time every substance that could possibly have possessed the requisite fibrous qualities was put to the test. Rags were out of the question, even straw was rapidly becoming too expensive, and other fibres had proved generally unsatisfactory. In 1854, however, Wells & Burgess, of London, obtained a patent for a chemical wood-pulp, and, a year later, Hugh Burgess, of Pennsylvania, invented a process by which the wood of the poplar might be used. The use of ground wood-pulp dates from 1844, when a German, named Keller, invented a wood-grinding machine of such practicability that Voelter, the manufacturer, quickly purchased the invention. It was Voelter himself, however, who first conceived the idea of grinding wood by stones and it is due to this development of the original machine that he is so commonly credited with having been its actual discoverer. It was about 1847, that, having perfected his improvements, Voelter began to use the ground wood-pulp, not only in the making of newspaper, but for many other purposes, and, about two years later, the same system was adopted by the French manufacturers at Souche. The use of this material in the United States was first made by Alberto Pagenstecher, whose factory was located at Stockbridge, Mass., but, while he was very successful in making paper from ground wood, it was not put into printing-paper until 1867, when Wellington Smith, Warner Miller, and William E. Russell adopted that process. Since the introduction of wood-pulp, however, the paper industry has grown with great rapidity. Whereas, in 1850, the 500 mills, with their capitalization of about \$18,000,000, were producing paper to the value of about \$17,000,000 per annum, in 1870, the number of mills had increased to 669, and the annual production to \$48,436,935. The following table, compiled from the last report of the United States Census, shows the status of the industry since 1880:

AMERICAN PAPER INDUSTRY.

	1880	1890	1905
Number of establishments.....	742	749	761
Capital.....	\$48,139,652	\$89,829,548	\$277,444,471
Wage earners.....	25,631	31,050	65,964
Wages.....	\$8,970,133	\$13,204,828	\$32,019,212
Value of product.....	\$57,366,860	\$78,937,184	\$188,715,189

Another indication of the development of the industry may be seen in the statement of the exports and imports. In 1850, for example, the importation of rags amounted to \$750,000, while the imports of paper also aggregated nearly \$500,000. By 1870, trade conditions had so changed that while the importation of rags aggregated more than \$4,000,000, the imports of paper amounted to scarcely more than \$350,000. In 1870, the amount of paper exported represented less than \$20,000, whereas, to-day, Amer-

ica's exportations of paper are far in excess of \$8,000,000.

**Paper Money.** See MONEY, PAPER.

**Paper-mouth,** a fish. See CRAPPIE.

**Paper-mulberry.** See MULBERRY.

**Paper-nautilus.** See ARGONAUT.

**Paper Pulp.** See PAPER AND PAPER MAKING.

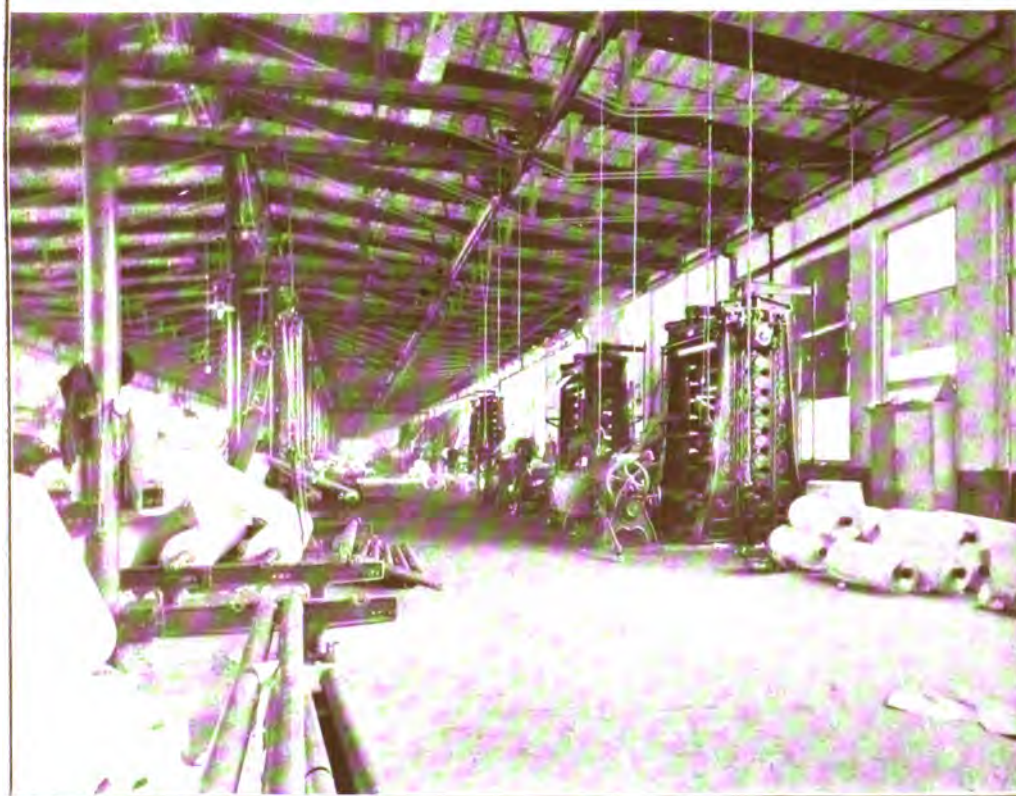
**Paphlagonia**, páf-la-gó'ní-a, an ancient geography, a division of Asia Minor, bounded on the north by the Black Sea (*Pontus Euxinus*), on the east by the River Halys, separating it from Pontus, on the south by Galatia, and on the west by Bithynia. Besides the Halys (now Kyzyl-Irmak), the waterways were the Amnias (Goek-Irmak), and the Parthenius (Bartin-Chai). The coast was fertile, the interior well wooded, game abundant, the principal industry sheep-raising, and the people famous horsemen. The region was subject nominally to Lydia, Persia, and Macedonia in succession, still keeping its own actually independent princes. After Alexander's death Paphlagonia and Cappadocia became a part of Pontus, and then a Roman province. The chief city was the Greek colony of Sinope.

**Paphos**, pá'fós, two ancient cities on the island of Cyprus. The earlier, called "Old Paphos" (Palapaphos) was founded by the Phœnicians on the southwest coast near the mouth of the river Bocarus, possibly in the 10th century B.C., and was the sacred city of Aphrodite, probably not the Greek goddess but the Semitic Astarte, whose famous temple, the object of pilgrimage in the pre-Christian era, is now entirely destroyed, save for a fragment of the cyclopean masonry still preserved at Kuklia, the present town. The new city (Neapaphos), ten miles northwest of the old, was a Greek colony, of great marine and commercial importance; in Roman times it was the capital of the island; it is now called Baffo. Consult: Cobham, 'Bibliography of Cyprus' (1886); Ohne-falsch-Richter, 'Kypros' (1893); Enlart, 'L'Ile de Chypre' (1897, in 'Bulletin de la Société Géographique').

**Papias**, pá'pī-as, Christian writer, bishop of Hierapolis. He is described by Irenæus and later writers as a "hearer of John and a companion of Polycarp." He suffered martyrdom at Pergamus in 163 A.D. He was one of the earlier believers in the millennium, that is, the personal reign of Christ on earth for a thousand years after the resurrection of the dead, and was the author of five books of commentaries on the saying of our Lord (*Ἀβὺρ Κυριακῶν Ἐκλήσεων*) a few fragments of which are extant. It is from them that we learn that Saint Matthew's Gospel was traditionally believed to have been written in Hebrew, and the evangelist Mark to have been the interpreter or amanuensis of Peter in writing the Third Gospel. Consult: Hall, 'Papias and His Contemporaries' (1899); Weissenbach, 'Das Papiasfragment bei Eusebius' (1874); 'Die Papiasfragmente über Marcus u. Matthäus' (1878).

**Papier-maché**, pāp-i-ā' mā-shā, a manufacturing material or substance made of cuttings of white or brown paper boiled in water, and beaten till they are reduced into a kind of paste, and then boiled with a solution of gum arabic or of size to give tenacity to the paste. Sulphate

# PAPER MAKING.



1 Machine Room — dry end.

2. Super Calender Room.



## PAPILIO—PAPINEOU

of iron, quicklime, and glue, or white of egg, are sometimes added to enable the material to resist the action of water, and borax and phosphate of soda to render it to a great extent fire-proof. It is used for making all sorts of useful and ornamental articles that can be formed in molds. When dry the objects are usually covered with a mixture of size and lampblack, and often ornamented with colored designs, or inlaid with mother-of-pearl, and lastly they receive a coat of varnish. Sometimes the papier-maché is made by pasting or gluing sheets of paper together, and pressing them when soft into the form which it is desired to give them.

**Papilio**, a genus of butterflies (q.v.), popularly known as "swallow-tails" from the prolonged appendages of the posterior margin of the hind wings. The technical characters of the genus are found in the venation of the wings: Internal vein of hind wing wanting, its place occupied by the submedian; median and submedian veins of fore wing united by a cross-vein, from the submedian end of which a short internal vein arises. The caterpillars are smooth and fleshy, and when disturbed protrude from the region of the thorax a pair of soft filiform "stink-horns" giving an offensive odor. The chrysalids are angulated and naked, and are suspended by a loop of silk passed about the middle and by a silken button at the caudal end. Although the imagos vary greatly, they are usually of large size and showy colors. Probably upward of 500 species are known, abounding in tropical countries; the genus is very poorly represented in Europe, but North America has nearly thirty species. Among our best known eastern species are *P. asterias*, a handsome black and yellow form; *P. turnus*, with the wings a rich yellow bordered and barred with black, and *P. troilus*, generally rusty black with the posterior half of the hind wing greenish blue. The Ajax butterfly (*P. ajax*) is one of those interesting species which exhibit seasonal polychromatism. It somewhat resembles the *Asterias*. The *P. philenor* is another black species, but it lacks the yellow spots and shows a beautiful greenish reflection on the upper surface of the wings. The caterpillars of papilios are somewhat destructive to particular plants, but have not the economic importance of the cabbage butterflies (*Pieris*, etc.), which, like them, have the front legs well developed and are placed with them in the family *Papilionidae*.

**Papilionaceæ**, a division of plants, usually treated as a family of the *Leguminosæ*. They comprise both herbs and woody plants, and many are stem- or tendril-climbers. The leaves are generally oddly pinnate. The flowers are disposed in racemes, more rarely in heads, and their distinguishing characteristic is that when the corolla is full blown, the superior petal resembles the extended wings of a butterfly (Latin, *papilio*). Examples are the blossoms of the pea and bean. The papilionaceous corolla consists of five petals. The superior petal, which usually folds over the inferior ones in æstivation, is called the  *vexillum*  or standard; the two lateral ones are called the  *alæ*  or wings; and the two inferior ones, which are often united slightly by their lower margins so that their union resembles the keel of a ship, are called the  *carina*  or keel. These last two petals are usually

wholly or partially enfolded by the  *alæ* , and themselves enfold the reproductive organs. The *Papilionaceæ* form an extensive group, divided into seven tribes and containing more than 300 genera. They occur in all parts of the world, but are especially well represented on the steppes of southern Russia and western Asia. The family includes several cultivated plants of importance (peas, beans, lentils, soy-beans, etc.; yield gums and dyes; and in one case (*Laburnum-seeds*) furnishes a poison.

**Papilla**. See **SKIN**.

**Papin**, pā'pīn (Fr. pā-pān), **Denis**, French physicist: b. Blois 22 Aug. 1647; d. England about 1714. He practised medicine for a time at Paris, but turned his attention to physical sciences, assisted Huygens in the construction of the air-pump, and during a visit to England was admitted a fellow of the Royal Society. Being a Protestant, the revocation of the Edict of Nantes prevented his return to his native country, and on leaving England he settled at Marburg, in Germany, in 1687, as professor of mathematics. But he again came to England in 1707. The real importance of Papin's many researches and experiments was long unperceived. He invented the double air-pump and the air-gun, a "digester" for cooking by means of liquids under produced atmospheric pressure, and the safety-valve, first used in the "digester." In 1690 he constructed the first steam-engine with a piston, and in the same year a boat with a paddle wheel revolved by a water-wheel supplied by means of a pumping-engine. Consult: Thurston, 'Growth of the Steam Engine' (1878); Gerland, 'Life' (1881).

**Papineau**, pā-pē-nō, **Louis Joseph**, Canadian politician: b. Montreal, P. Q., October 1789; d. Montebello, P. Q., 23 Sept. 1871. He was educated at the Seminary of Quebec, studied law, and was admitted to the bar in 1812, but while still a student in 1809 he was elected to represent Kent in the Canadian assembly. During the War of 1812 he was captain of militia. In 1811 he had succeeded his father as member of assembly for one of the districts of Montreal and in 1817 he was elected speaker, which office he held for 20 years as leader of the French-Canadian party. He was continually at variance with the royal governors and in 1827 Lord Dalhousie adjourned parliament and resigned rather than allow Papineau to take his seat as speaker. He disapproved the union of Upper and Lower Canada and in 1834 framed the "Ninety-two Resolutions" which were sent to England in exposition of the grievances and demands of his party. In 1834 he consulted with William Mackenzie, the revolutionary leader of Upper Canada, regarding the consolidation of their forces and in 1837 was deprived of his office of captain in the militia. In that year he attended the meeting in which a revolution was decided upon, and a warrant was issued for his arrest for high treason, though he had fled to the United States at the outbreak of the rebellion. He escaped to France, but was pardoned in 1847 and returned to Canada. He again entered parliament, but finding himself without influence retired in 1854. See Read, 'The Canadian Rebellion of 1837' (1896); Kingsford, 'History of Canada' (1887-98).



## PAPINIANUS — PARÁ

**Papinianus**, pā - pīn - ī - ā'nūs, **Æmilius**, Roman jurist: b. about 140 A.D.; d. 212. He accompanied the Emperor Septimius Severus as prætorian prefect to Britain, and was put to death by Caracalla. Papinianus was the chief of all the Roman jurists. His most important writings were his 37 books of 'Quæstiones' (legal questions) and 19 of 'Responsa' (decisions). A few fragmentary portions exist as excerpts. These works were, until the preparation of the Pandects by Justinian the main repository of jurisprudence connected with the exposition of original authorities. In the Pandects (q.v.) many extracts from him appear, forming about one twelfth of the total number there given. Consult Brinz, 'Die Berliner Fragmente vor-justinianischer Rechtsquellen' (1884).

**Pappenheim**, pāp'pēn-him, **Gottfried Heinrich**, COUNT, German military officer: b. Franconia, Germany, 29 May 1594; d. Leipsic, Germany, 7 Nov. 1632. He was educated at Altdorf and Tübingen, entered the army, and as a colonel in the battle of Prague, 1620, was distinguished for his bravery. In 1623 he was appointed by the emperor to the command of a regiment with which he served in Lombardy until 1625, and in 1626 he crushed an insurrection in Upper Austria in which 40,000 peasants were killed by his forces. At Magdeburg with Gen. Tilly in 1830 he is charged with great cruelty; he fought with Wallenstein at Leipsic in 1831, and was fatally wounded at the battle of Lützen in 1832. He was a man of indomitable courage but rash and impetuous. Consult Hess, 'Gottfried Pappenheim' (1855).

**Pappus**, Greek mathematician. He lived at Alexandria toward the end of the 3d century of the present era. His great work, 'A Mathematical Collection,' is the source of all our knowledge of ancient Greek mathematics. Only a mutilated portion of the original eight books is extant, and this contains, besides geometrical problems and theorems, an essay on mechanics. These fragments were published by Hultsch at Berlin in 1876-8.

**Pappus**, the downy appendage that crowns many single-seeded seed-vessels, such as the down of the dandelion, etc. It represents the calyx of the flower, and may be pilose, with the threads unbranched, or plumose, with feathery threads; sessile, with the threads resting directly on the achenes; or it may be supported on a longer or shorter beak. It acts as a parachute in directing the fruit when it becomes separated from the parent plant. The term pappus may also be applied to other forms of a persistent calyx, as a crown or a circlet of scales. In such plants as the dandelion the interweaving of the stipitate pappi produces an extremely beautiful and delicate arrangement.

**Pap'ua**. See NEW GUINEA.

**Papuan Subregion**, a faunistic subdivision of the Australian Region which embraces the mountainous, heavily forested islands of the Papuan archipelago, north of Australia. See ZOOGEOGRAPHY.

**Papy'rus**, a species of sedge (*Cyperus papyrus*), a native to Egypt and Palestine, but now extinct in the former country, though found higher up the Nile Valley. It has been introduced into many warm countries, where it has

spread in damp soils. It has a perennial rootstock which is tough, woody, and aromatic. From this arise the long sharp-edged, sharp-backed leaves and the stout, smooth, erect, bluntly three-angled stems which often exceed six feet in height. They bear a large umbel of attenuated branchlets but no leaves. Because of its striking appearance the plant is a favorite in aquatic gardens, but not being hardy it is started in the greenhouse during early winter and transplanted to its summer quarters. Root-division is the favorite method of propagation, the plants for this purpose being brought in from the garden as soon as frost approaches in the autumn. The plant has been used for many purposes such as for making boats, baskets, boxes, and wicker work; its fibres, for making twine, rope, sailcloth, and mattings; the pith of the stems for food; and the dried rootstocks for fuel. It is far more famous, however, as the material from which Egyptian "papyrus" or paper was made, a use which has suggested its most popular name — Egyptian paper-plant. It is the *gome* of the Hebrew Scriptures, translated "bulrush" in King James' Bible. For making paper the thin fibrous skin was removed, the white substance of the stems cut into long thin sheets, and pressed together, after being laid crosswise in double layers, when it adhered by its own gluten and made continuous sheets of any desired length. See PALÆOGRAPHY.

**Pará**, pā-rā', **Gran Pará**, or **Grão Para**, grown pā-rā', maritime state of the Brazilian Confederation, lying on either side of the Amazon, bounded on the north by the Guianas (except Brazilian Guiana, a part of Pará) and the Atlantic, on the east by the Atlantic and the states of Goyaz and Maranhão, on the south by Matto Grosso, and on the west by Amazonas. Its area is 443,700 square miles. It has mountain ranges and plateaus on its interior boundaries, but its most striking physical characteristic is its great alluvial plain traversed by the lower waters of the Amazon and Tocantins systems, so that the state is unusually fertile and has remarkable facilities for commerce and transportation. There are settlements on nearly all the rivers: San Jose on the Jary, Almeirim on the Paru, Cametá on the Tocantins, Souzel, Porto de Moz, and Villarinho on the Xingu, Santarem on the Tapajoz, Obidos on the Trombetas, Macapá on the mouth of the Amazon, and Pará or Belem on the Pará. The india rubber trade, which now exceeds 22,000 tons a year, is building up towns in the interior away from the rivers. Cacao, vanilla, sarsaparilla, coffee, sugar, hides, copaiba, and Brazil nuts are the other leading products and exports of the state, which probably has large mineral wealth awaiting capital. The climate is equable and comparatively healthy, in spite of the floods along the river courses. The only railroad is from the capital, Pará (q.v.), to the coast.

**Pará** (originally SANTA MARIA DE BELEM, that is, St. Mary of Bethlehem; and hence called BELEM, the present official name), Brazil, capital city of the state of Pará, lying northeast of Rio Janeiro on the Rio de Para, south of the Island of Marajo, in lat. 1° 27' S. and lon. 48° 30' W. It is connected with Bragança on the coast nearly 80 miles distant by a railway, and is an important port, the only one of the state; it has regular

## PARA — PARABOLA

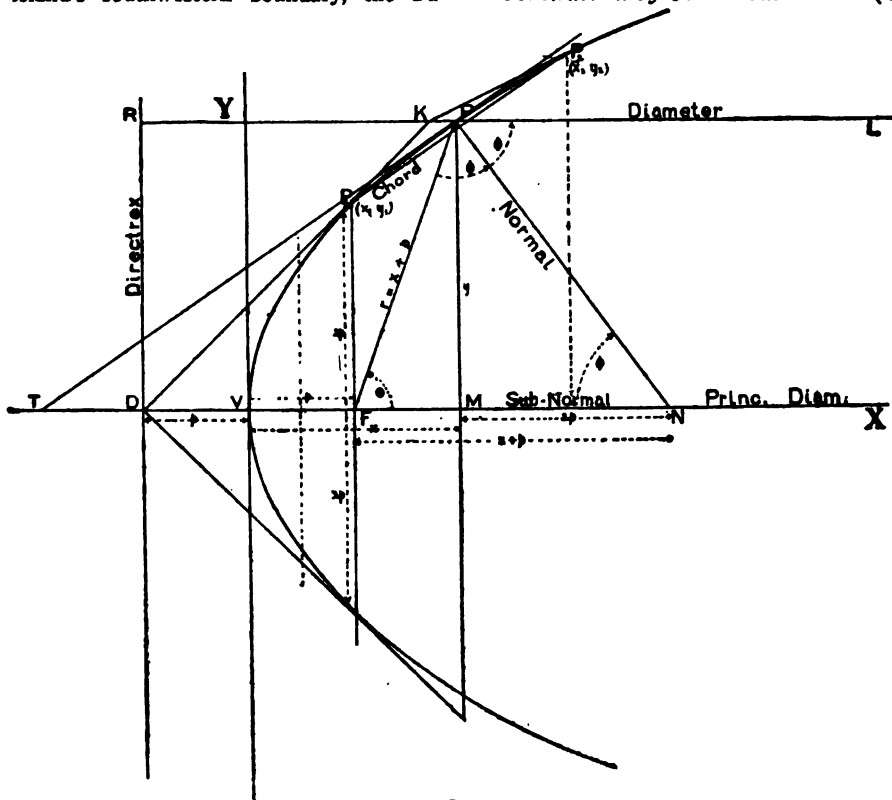
steamboat connections with Brazilian, European, and North American ports, and is the seat of several consuls, one from the United States of North America. An episcopal city, it has a cathedral built in 1720, when the city was in its 106th year, a government palace, a library, lyceum, theatre, botanical garden, two seminaries, street railways, and gas-lights. There are several banks. Pará is the greatest rubber shipping port in the world; in 1898 the value of this item was \$68,850,000, out of a total of \$72,000,000, the other items being those mentioned in the preceding article.

**Pará, Rio de,** arm of the sea, forming the embouchure of the Tocantins River on the northeast coast of Brazil, near the mouth of the Amazon, from which it is separated by Marajo Island. The island's southwestern boundary, the Pa-

circular base by a plane parallel to one of the elements. Its characteristic property is that every point therein is equidistant from a given point called the focus, and a given straight line called the directrix.

**Construction by Points.**—(See Fig. 2). Let  $F$  be the focus and the line  $DN$  the directrix, and draw  $FD$  perpendicular to the directrix. The point  $A$ , midway between  $F$  and  $D$ , will be on the curve, by definition, and is called the vertex. Take any distance  $DM > DA$ , draw  $PMP'$  perpendicular to  $DF$ , and, with  $F$  as a centre and  $DM$  as a radius, describe an arc. This arc will intersect  $PMP'$  in two points,  $P$  and  $P'$ , which will give two points on the parabola. Proof:  $FP = DM = PN$ ,  $\therefore P$  is on the parabola by definition.

**Construction by Continuous Motion** (See Fig.



**FIG. 1.**

ranan, carries some of the water of the Amazon to the Para. The two rivers were no doubt connected even more closely formerly. The Para is 138 miles long, 20 miles wide opposite the city of Para and 40 miles wide at the mouth. It gives its name (which originally meant "river," and occurs in so many compounds, for example, Paraguay, Parana, Paranan, Parananagua) to the state and city of Pará (qq.v.).

**Para**, a Turkish and Egyptian coin, the 40th part of a piastre, valued at one fifth of a cent.

**Para, or Assai, Palm.** See PALMS.

**Parabola**, in mathematics, a plane curve and that one of the conic sections obtained by cutting the surface of a cone with a

2).—Fasten a string at S, one end of a right triangle, and the other end at F, making the length  $SPF = SN$ . With the triangle in any position, with the short side against a straight edge on DN, bring the string taught against the triangle with a pencil point at P. Move the triangle along the straight edge, that is, along the directrix, keeping the string taut and the pencil point against the moving triangle. The pencil will trace the parabola, since in every position  $PF = PN$ .

*History.*—The parabola is, with the exception of the circle, the oldest of the historic curves, tradition ascribing its discovery to the Greek mathematician Menæchmus (350–330 B.C.), as incident to an attempt to solve the problem of the two mean proportionals, to which

## PARABOLA

the famous Delian problem of the duplication of the cube has been reduced by Hippocrates of Chios. The object of this problem is to find two quantities,  $x$  and  $y$ , such that  $a : x = x : y = y : b$ , which requires that the equations  $x^2 = ay$  and  $y^2 = bx$  shall be satisfied simultaneously. Since these are equations of parabolas, the problem requires the determination of the co-ordinates of the point of intersection of the two curves. The parabola is also remarkable as the first curve whose area, included between the curve and any chord, was obtained. This is considered to be the greatest mathematical achievement of Archimedes (287-212 B.C.), introducing the "method of exhaustions," in many respects the same as that of the integral calculus. The parabola occurs frequently in the arts

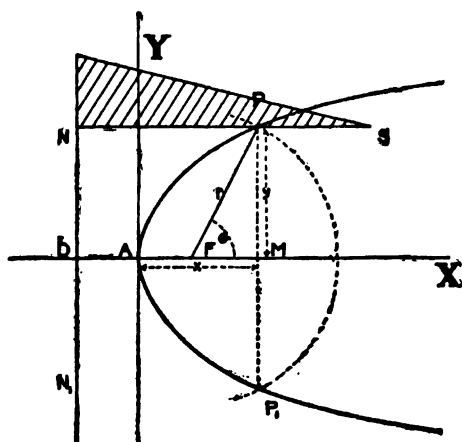


FIG. 2.

and sciences. The cables of a suspension bridge loaded uniformly hang in a parabola; the path of an unresisted projectile, as a cannon ball or a waterspout is a parabola; railway curves are frequently parabolas; and beams loaded in particular ways often bend into parabolic shapes.

**Equation of the Parabola in Cartesian Co-ordinates.**—The normal or simplest form of the equation is obtained by assuming the principal axes, that is, the line through the focus perpendicular to the directrix, as the X-axes and the tangent at the vertex as the Y-axes. (See Fig. 1.) Denote the co-ordinates of any point P by  $(x, y)$ , and the distance VF by  $p$ . Then  $FP^2 = (x-p)^2 + y^2$  and  $VP = DM = x + p$  and  $(x+p)^2 = (x-p)^2 + y^2$ , which reduces to the equation of the parabola in the standard form (I)  $y^2 = 4px$ .

**Equation of the Parabola in Polar Co-ordinates.**—Assuming  $F$  as the pole and  $r$  and  $\theta$  as the co-ordinates of  $P$ , we have  $y = r \sin \theta$  and  $x = p + r \cos \theta$ ; substituting these values in (1) and solving for  $r$  we find as the polar equation of the curve (2)  $r = \frac{2p}{1 - \cos \theta}$ .

*Diameter of the Parabola.*—A diameter of any curve is defined to be the locus of the middle points of a system of parallel chords.

Let  $(x_1, y_1)$  and  $(x_2, y_2)$  be the co-ordinates of  $P_1$  and  $P_2$ , the extremities of the chord  $P_1 P_2$  (Fig. 2) and  $(x, y)$  the co-ordinates of the middle point. Since  $y_1^2 = 4px_1$  and  $y_2^2 = 4px_2$ ,

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{4p}{y_2 + y_1} = \frac{2p}{y} = m,$$
 where  $m$  is the slope of the chord. That is, the equation of a diameter is  $y = \frac{2p}{m}$ , which proves every diameter to be parallel to the principal diameter, whose equation is  $y = 0$ . This occurs when  $m = \tan \frac{\pi}{2} = \infty$ , showing the principal axes as bisector of its chords at right angles.

**Equation of the Tangent.**—Since the secant  $\frac{y - y_1}{x - x_1} = \frac{4p}{y_1 + y_2}$  becomes  $\frac{y - y_1}{x - x_1} = \frac{2p}{y_1}$  when  $y_2 = y_1$ , the equation of the tangent, defined as the limiting position of the secant as  $P_2$  approaches  $P_1$ , reduces to the form (3)  $yy_1 = 2p(x + x_1)$ . The right line  $y = mx + b$  intersects the parabola  $y^2 = 4px$  in general in two points, determined

by  $x = \frac{1}{m^2}(bm - 2p) \pm 2\sqrt{p^2 - bpm}$ . These become coincident when  $b = \frac{p}{m}$ , affording as the equation of the tangent in terms of its slope, (4)  $y = mx + \frac{p}{m}$ . By transformation of co-ordi-

nates, the equation of the parabola referred to any diameter, and the tangent at its extremity may be shown to retain the normal form (5)  $y'^2 = 4px'$ , and it follows that (3) will also retain the same form. By assuming  $y$  or  $y'$ , as the case may be, equal to zero we find the  $x$  intercept of the tangent equal to  $x$  or  $x'$ , that is, the sub-tangent is bisected at the vertex.

**To Construct a Tangent.**—By virtue of the foregoing property, when the point is on the curve, construct the ordinate of the point and lay off the length of the abscissa to the left of the vertex. Connect this point on the diameter with the point on the curve. If the point is outside the curve, draw the diameter of the curve through the point, lay off the distance measured on this diameter from the point to the curve to the right of the temporary vertex, and draw the chord through the point thus determined parallel to the tangent at the temporary vertex. The line through the points in which this chord cuts the curve and the given point will be the required tangents.

*The Normal.*—Since the normal is the perpendicular to the tangent at the point of tangency, its equation becomes (6)  $y - y_1 = -\frac{y_1}{2p}(x - x_1)$ , which cuts the axis at the point  $2p \div x_1$ .

The Subnormal is therefore constant and equal to  $2p$ . This property enables us to construct the directrix and the focus by laying off  $p$  to the left and to the right of the vertex,  $p$  being obtained by bisecting the subnormal. The focal radius  $FP = FN = x_1 + p$ , whence the angle  $FNP =$  the angle  $NPL$ ; that is, the normal bisects the angle between the focal radius and the diameter through any point. This property causes rays of light at the focus to be reflected in parallel rays, and is made use of in

## PARABOLANI—PARACLETE

parabolic reflectors. The two tangents  $y = mx + \frac{p}{m}$  and  $y = -\frac{1}{m}x - pm$  are perpendicular and intersect at the point whose abscissa is  $p$ ; that is, perpendicular tangents intersect on the directrix.

The *Latus Rectum* is the double ordinate through the focus and is equal to  $4p$ . The tangents constructed at the extremities of the latus rectum intersect on the directrix, and are therefore at right angles. The area of the parabola included between any chord and the curve is given by the formula

$$\text{area} = 2 \sin \theta \int_0^{x'} y' dx' = \frac{2}{3} \sqrt{2p} \sin \theta \int_0^{x'} x'^{\frac{1}{2}} dx' = \frac{4}{3} \sin \theta. (2p)^{\frac{1}{2}} x'^{\frac{3}{2}} = \frac{1}{3} \text{ of the area of the parallelogram constructed with the chord and } x' \text{ as its sides.}$$

*Rectification of Parabola.*—The length of a parabolic arc is obtained as follows (see CALCULUS):

$$S = \int \left[ r + \left( \frac{dx}{dy} \right)^2 \right]^{\frac{1}{2}} dy = \frac{r}{p^2} y \sqrt{y^2 + p^2} + \frac{p}{2} \log (y + \sqrt{y^2 + p^2}) + C.$$

If the arc begins at the vertex, then  $s=0$  when

$$y=0, \text{ or } 0 = \frac{p}{2} \log p + c_1 \text{ whence } S = \frac{1}{2p} y \sqrt{y^2 + p^2} + \frac{p}{2} \log \frac{y + \sqrt{y^2 + p^2}}{p}$$

*Radius of Curvature.*—The radius of curvature of the parabola at the point  $(x,y)$  is given by the formula

$$R = \pm \frac{\left[ 1 - \left( \frac{dy}{dx} \right)^2 \right]^{\frac{1}{2}}}{\frac{d^2y}{dx^2}} = \pm \frac{(1 + \frac{p^2}{y^2})^{\frac{1}{2}}}{\frac{p^2}{y^3}} = \pm \frac{(p^2 + y^2)^{\frac{1}{2}}}{p^2}$$

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**Parabola'ni**, men whose duty in the early church was to attend on the sick and diseased. The term was originally applied to gladiators, and is derived from the Greek *parabolos*, reckless, in allusion to the courage with which these laymen nursed those who suffered from infectious diseases. Such functionaries were attached to all the principal churches of the East, and at Alexandria they formed a corps of 500 men. Theodosius the younger increased this number to 600, because plagues and contagious diseases were common in Egypt. This emperor placed them under the jurisdiction of the chief magistrate, but they were appointed by the bishop, whose directions they were bound to follow. As the parabolani were bold and indifferent to death, laws were enacted to prevent them from exciting seditions which were particularly common at Alexandria. Their number was limited by Theodosius, and they were forbidden to attend at public assemblies, and courts of justice, unless they had some business there sanctioned by the law. More than once they showed themselves deserving of suspicion, as for

example at the Council of Ephesus in 449, when a Syrian monk named Barsumas, at the head of a band of armed parabolani, committed outrageous excesses and terrified the council into granting his demands.

**Parab'oloid**, in geometry, a solid figure traced out by a parabola revolving round its principal axis. It is a characteristic property of paraboloids that they have no centres except in the extreme cases, when they have an infinite number of centres. There are three varieties of paraboloids, elliptical, hyperbolic, and parabolic.

**Paracatu**, pã-rã-kã-too', Brazil, town in the eastern part of the state of Minas Geraes, 450 miles northwest of Rio Janeiro, on the river of the same name, which is an affluent of the São Francisco. The city dates from the middle of the 18th century, in which it was the centre of a rich auriferous district. The gold-washings are no longer of value; cattle, hides, sugarcane, and coffee are its important products. Pop. about 15,000.

**Paracelsus**, pã-r-a-sel'stüs (PHILIPPUS AU-REOLUS THEOPHRASTUS BOMBASTUS VON HOHENHEIM), Swiss physician, chemist, and charlatan: b. Maria-Einsiedeln, Canton Schwyz, 17 Dec. 1493; d. Salzburg 23 Sept. 1541. He acquired considerable real knowledge of medicine and chemistry, but spent his time in searching for a universal specific and the philosophers' stone. In his wide travels, extended to the East, he derived, in addition to the arts of alchemy and magic, a knowledge of certain remedies not then familiar to Continental physicians, and by this means effected numerous cures which brought him high prestige. In 1526 he became professor of medicine in the University of Basel, and there he burned publicly the works of Avicenna and Galen and declared himself the monarch of physic. He drew about him a school known as the Paracelsists, and claimed among his discoveries that of indefinitely prolonging life. In 1528, owing to a quarrel with the magistracy, he left Basel for a wandering existence in Switzerland, Alsace, and southern Germany. His methods of puffing long prevented a just estimate of him; but he is now seen to have enriched medicine and chemistry, and especially to have made great contributions to, if not to have founded, modern pharmaceuticals. A complete edition of his works (Latin) appeared at Basel in 1589. Consult the 'Life' by Hartmann (1887).

**Par'achute**, a mechanism of an umbrella shape, about 20 or 30 feet in diameter, attached to balloons, by means of which the aeronaut may descend slowly from a great height. It has a hole at the top to prevent oscillation. In 1783 the French physician Lenormand made several experiments with parachutes of 30 inches in diameter at Montpellier; and shortly after the machine (enlarged to something like its present dimensions) became well known through the public descents of Blanchard in Paris and London. Garnerin was the first to suggest their use for balloonists in case of accident. See BALLOON.

**Par'aclete** (*parakletos*, a counsellor; encourager; admonisher; or comforter), in the English translation of the Bible, the Comforter, the Holy Ghost. Jesus promised to his disciples (John xiv. 16) that his Father would send them another Comforter the Spirit of Truth, who

## PARADIN—PARAFFIN

should abide with them forever, teach them all things (ver. 26), and bring all his sayings to their remembrance. It is also the name of a monastery near Troyes which Abelard founded and where he was buried.

**Par'adin**, a vegetable poison. See **HERB PARIS**.

**Par'adise**, the garden of Eden. The word is originally Persian, and signifies a park. It has been introduced into modern languages as a name for the garden of Eden (and hence of any abode of happiness). See **EDEN**.

**Paradise-bird**. See **BIRDS OF PARADISE**.

**Paradise Fish**, or **Fish of Paradise**, small Oriental fish (*Polyacanthus viridicaudatus*) allied to the climbing-perch (*Anabas*), which belongs naturally in the fresh-water streams, and is extensively bred in aquariums by the Chinese, on account of its brilliant coloring. Fantastic varieties, with greatly extended and modified fins and tail have been developed.

**Paradise Lost**, an epic poem in 12 books, by John Milton (q.v.), published in 1667. It has for its subject the fall of man. It ranks preeminently first among English epics, and as one of the great works of universal literature. Its vastness is suggested by the statement of a critic that its "horizon . . . is not narrower than all space, its chronology not shorter than eternity."

**Paradise Regained**, epic poem by John Milton, first published in 1671. It is supplementary to 'Paradise Lost,' but lacks somewhat of the strength and force of its predecessor.

**Par'adox**, that which runs counter to general idea and expectation, and appears accordingly to be incredible and incomprehensible, especially in literature or science.

**Paradox'ure**, a civet of the Oriental genus *Paradoxurus*, of which there are 10 or a dozen species popularly called palm-civets (q.v.). The tail is not prehensile but may be curiously coiled.

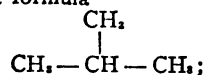
**Paraffin** (Latin, *parum affinis*, without affinity), a white, wax-like substance, solid at ordinary temperatures, which may be obtained by the distillation of carbonaceous materials, or of oily or coal-bearing shales. Crude petroleum oil is now the chief source of the commercial supply of paraffin. The oil is subjected to a process of fractional distillation, by which naphtha, kerosene, light mineral oil, and heavy mineral oil are successively obtained. The distillation is usually carried on until further application of heat would be likely to cause carbonization; and the paraffin is then left in the heaviest, least volatile portions. When the process is correctly conducted, the paraffin crystallizes out when the heaviest oil is allowed to stand in the cold; and it is afterward purified by washing with benzine, and by such further treatment as may be required. Paraffin is somewhat lighter than water, is insoluble in nearly all of the ordinary solvents, and is not affected readily by acids or alkalis. It is not a definite chemical substance, but consists of a mixture of hydrocarbons in varying proportions,—chiefly of those designated as "paraffins" (q.v.). It melts readily and without decomposition, but its melting point varies with its composition, and may range from 120° F. to about 200° F. It is greatly used for making

candles, either alone or when mixed with a small proportion of stearin. It is also used in quantity for coating acid tanks, for waterproofing paper, and other fabrics, for producing a high gloss in fine laundry work, and is an excellent electrical insulator, being used for impregnating the cotton coverings of electrical conductors, being also valuable in this application because it renders the cotton impervious to moisture. Paraffin is often called "paraffin wax." See **PARAFFINS**.

**Paraffins**, in chemistry, the series of hydrocarbons that have the general formula  $C_nH_{2n+2}$ . They are all distinguished by a marked chemical inertness, and derive their name from this circumstance. (Compare **PARAFFIN**.) The paraffins occur in nature in petroleum oil, and they are also obtained by the destructive distillation of coal, peat, carbonaceous shale, and numerous other substances. They may be roughly separated, from petroleum, by fractional distillation; but their exact separation, when mixed in such a general manner, is attended by the greatest difficulty. Many of them may be prepared, however, by heating the iodides of the alcoholic radicals with metallic zinc. Ethane ( $C_2H_6$ ), for example, may be obtained by treating metallic zinc with iodide of methyl,  $CH_3I$ ; the reaction in this case being  $Zn + 2CH_3I = C_2H_6 + ZnI_2$ . The best known of the paraffins are as follows, the temperatures opposite them being their boiling points:

Methane	$CH_4$	(Gaseous)
Ethane	$C_2H_6$	"
Propane	$C_3H_8$	"
Butane	$C_4H_{10}$	34° F.
Pentane	$C_5H_{12}$	100°
Hexane	$C_6H_{14}$	158°
Heptane	$C_7H_{16}$	210°
Octane	$C_8H_{18}$	255°
Dodecane	$C_{12}H_{26}$	396°
Heedecane	$C_{16}H_{34}$	532°

The paraffins belong to the fatty series of hydrocarbons (see **FATTY COMPOUNDS**), and their constitutional formulæ therefore consist entirely of open chains, though these chains may be branched, as will presently appear. The formula for propane, for example, may be written  $CH_3-CH_2-CH_3$ . Any one of the paraffins may be regarded, from a structural point of view, as derived from the preceding member of the series by substituting the radical methyl ( $CH_3$ ) for a hydrogen atom. Thus if one of the hydrogen atoms in the right-hand methyl group of the foregoing formula for propane be itself replaced by  $CH_3$ , we shall have the new compound  $CH_3-CH_2-CH_2-CH_3$ , which is butane. A paraffin which contains only two methyl radicals is said to be a "normal paraffin"; and in the table of boiling points given above, the corresponding paraffins are all supposed to be "normal." Methane, ethane, and propane are not capable of existing in any but the "normal" form; but the higher paraffins may also exist in isomeric forms. In introducing the methyl radical in propane, for example, we replaced one of the hydrogen atoms in the right-hand  $CH_3$  group; but we might equally well have replaced one of those in the central  $CH_2$  group, and in that case the resulting compound would have had the structural formula



## PARAGUA—PARAGUAY

and while this compound still has the empirical formula  $C_4H_{10}$ , and is still known as "butane," there is obviously no reason for supposing that it would have the same physical and chemical properties as the butane which contains only two methyl groups. There are, in fact, two butanes known. One of these ("normal butane") boils at  $34^\circ$  F., has a specific gravity of 0.600, and may be prepared by the action of zinc upon ethyl iodide at  $300^\circ$  F. The other (known as "iso-butane," "trimethyl-methane," or "secondary butane") boils at about  $3^\circ$  F., and may be prepared by heating aluminum chloride with iso-butyl iodide; the iso-butyl iodide being prepared by the action of hydriodic acid upon iso-butyl alcohol, which, in turn, is obtained by the fermentive action of "*Bacillus butylicus*" upon sugar or glycerine. The higher members of the paraffin series admit of an increasingly great number of isomeric modifications, many of which have not yet been studied, nor even prepared. Dodecane, for example, may exist in as many as 355 different isomeric modifications.

**Paragua**, pā-rā'gwā, Philippines, a province including the part of the island of Palawan that lies north of the 10th parallel of latitude, the Calamianes Islands (q.v.) and the Cuyo Islands (q.v.); area of the mainland, 1,366 square miles, with the dependent islands, 1,635 square miles. The mainland of Paragua is mountainous, the central mountain range of Palawan extending from northeast to southwest; the rivers are numerous but short, as in the rest of the island. The staple crops are tobacco, rice, sugar, and vegetables, but nothing is raised for export; the forests are valuable and extensive; and gold, lead, and other minerals are found. The most important industries are stock-raising and the gathering of edible bird's nests. Cowries are also gathered in the islands and exported. The only mechanical industry is the weaving of textiles for home use. Civil government was established in this province in 1902, and the capital located at Cuyo, island of Cuyo. Pop. of the entire province, 49,850; of the mainland, 25,000.

**Paraguari**, pā-rā-gwā-rē', Paraguay, department, and capital city of the department in southern Paraguay. The city, 35 miles southeast of Asunción, is situated on an eminence overlooking a tributary of Lake Ipoa, and is on the railroad between Asunción and Encarnación. There is much trade in tobacco from Villa Rica and the surrounding country. The city, founded in 1775, was the scene in 1811 of a victory over an invading army from Argentina. Its growth has been remarkable. Pop. (est.) 7,000.

**Paraguay**, pā-rā-gwī' or pā-rā-gwā, Republic of, a country of South America, enclosed between Brazil, Argentina, and Bolivia, extending from lat.  $20^\circ 10' 14''$  S. to  $27^\circ 35'$  S., and from lon.  $54^\circ 37'$  W. to  $62^\circ$  W. The total area is given as 121,973.68 square miles.

*Political Divisions, etc.*—The country is divided into two sections by the Paraguay River, the eastern section being called El Paraguay Oriental and the western El Gran Chaco (see CHACO, EL GRAN) or El Paraguay Occidental. For the purposes of government, Paraguay is divided into 84 departments, which are grouped to form 24 electoral districts, three of the districts being comprised in the capital and one

consisting only of Villa Hayes and its territory. The largest city and capital of the republic is Asunción (q.v.), pop. about 54,000, including 4,600 foreign residents. Other cities and towns are: Villa Rica (25,074 inhabitants), connected by railway with the capital; Villa Concepción (13,654), commercially important, a port of entry and delivery on the Paraguay River; Caazapá (14,914); Luque (14,777), San Estanislao (10,920); Villa del Pilar (5,740); Villa Encarnación (10,742); Yuty (9,800); Capiatá (9,207); Carapeguá (13,930); Ytaugá (6,624); Villeta (7,072); Villa San Pedro (7,987); and Paraguari (9,128). A consequence of the government's efforts to encourage immigration and colonization is seen in the establishment of the following colonies:—Villa Hayes Colony, nearly opposite Asunción in El Gran Chaco, settled by families from Switzerland, France, Italy, Belgium, Germany, Austria, and Spain; San Bernardino Colony, settled principally by Germans; Colonia Nacional, on the railway from the capital to Villa Encarnación; Nueva Alemania Colony, in the department of San Pedro; Elise, or San Antonio, Colony, in the department of San Lorenzo de la Frontera; Nueva Australia Colony, containing Australians, English, and Paraguayans; Colonia Cosme, in the department of Caazapá, also inhabited by Australians; Colonia Guillermo Tell, a Swiss settlement; and the Hohenau Colony, a small community of German, Brazilian, and Paraguayan coffee planters. See also under the subtitle *Population*.

*Topography and Hydrography.*—The general level of El Gran Chaco and the lowlands of the western part of El Paraguay Oriental is approximately 250 or 300 feet above that of the sea; the eastern side of Paraguay is, however, much higher, with the exception of the extreme southeast, which is a low-lying, swampy region. An extension of the plateau or highlands of Brazil is seen in the northeast, the so-called Sierra of Amambay and lateral spurs running toward the Paraguay River. Through the centre of the country, from Villa Encarnación toward the northeast, run the cordillera of Villa Rica and the Caaguazú Mountains; and a transverse range, crossing the Paraná River into Brazil, forms the great cataract of Guayrá (q.v.). These ranges have an elevation above sea-level of 1,500 to 2,000 feet. The position of Paraguay Oriental has been aptly compared with that of the State of Illinois, for its southern boundary is at the confluence of two great rivers, and more than 800 miles above Buenos Ayres and the La Plata estuary. Of these rivers, one, the Paraguay, forms the western boundary below Asunción, while, above the capital, it passes between the eastern and western divisions of the republic, as already stated; the other, the Paraná, separates Paraguay from the Argentine Republic and Brazil on the south and southeast. A large part of the territory lying between these great streams is not yet well known. The Pilcomayo River, flowing southeastward from Bolivia, forming the southern boundary of Gran Chaco, and joining the Paraguay below Asunción, is navigable for a distance of 150 miles from its mouth. The Paraná flows 1,367 miles from its source in Goyaz, Brazil, before uniting with the Paraguay; the latter is about 1,800 miles long; both have large tributaries in Paraguay Oriental.



## PARAGUAY

**Mineral Resources and Soils.**—The northern part of Paraguay is covered with limestone, while the southern is of sandstone formation. Marble is abundant in the north, iron in the south. Several veins of copper have been found. Other minerals are: kaolin, in the department of Caápué, Ibicuí, Quiquio, Villa Rica, Cordillera, Villeta, and Luque; talc; graphite; serpentine stone; basalt, near Villa Encarnación; porphyry, and arsenic. There are four distinct varieties of soil, namely, (1) sandy, either white or red, the latter being fertile; (2) a good agricultural soil, consisting of clay and quartz, oxide of iron, lime, and miscellaneous substances; (3) humus, characteristic of forest lands; and (4) the black alluvial deposits, prevailing in western Paraguay.

**Climate.**—Paraguay is regarded as a sanitarium by the inhabitants of some of the neighboring countries. The mean temperature at Asunción is about the same as that of Cairo, Egypt; Hongkong, China; and Caracas, Venezuela, while the mountainous interior regions are decidedly cooler. Rain is abundant throughout the year; snow is entirely unknown; storms, with accompanying high winds and very severe thunder and lightning, occur frequently.

**Forests and Agriculture.**—Woods which are valuable on account of their extraordinary durability and powers of resistance are characteristic forest products; many of these being so heavy that they sink when thrown into the water. Dyewoods of many varieties, medicinal and resinous trees, wild vanilla, etc., are found. The chief and most distinctive product of the country is yerba, the "Paraguayan tea," also called yerba maté; sugarcane, cotton, tobacco, mandioca, rice, maize, coffee, textile plants (carguatá, ibira, etc.), oranges, bananas, and grapes are successfully cultivated. For cattle-raising, the conditions are even more favorable than those of Argentina. The live stock at the beginning of 1909 numbered 5,000,000 head of cattle.

**Commerce and Manufactures.**—Exports from Asunción are valued at about \$3,000,000 gold, the largest item, being yerba maté, hides, tobacco, extract of ironwood, and beams of hard wood. The exports were valued at about \$2,500,000 gold and the imports at \$3,000,000 gold. The total foreign trade of Paraguay during 1908 was given as follows: exports, \$3,867,093 gold, and imports, \$4,072,950 gold. In 1900 the value of exports was \$2,555,924 and of imports \$2,652,067. In the same year there were in the entire country 2,298 business houses, with a capital of \$66,673,000, currency; and 1,094 industrial establishments, capitalized at \$135,448,066, currency. The most remarkable industrial product is the famous *manduti* (cobweb) lace. Cotton and woolen fabrics are manufactured in a primitive fashion. Wines are made from grapes or oranges. There are manufacturing of cigars, ice, soap, and matches; also a number of tanneries, potteries, and flour mills.

**Navigation, River Service, Railway, etc.**—The total number of vessels which entered the port of Asunción during 1908 was 1,320, and 1,184 cleared. Communication with Buenos Ayres and Montevideo is furnished by a great number of steamboats. The Paraguayan Central Railway runs from Asunción to Pirapó, 155

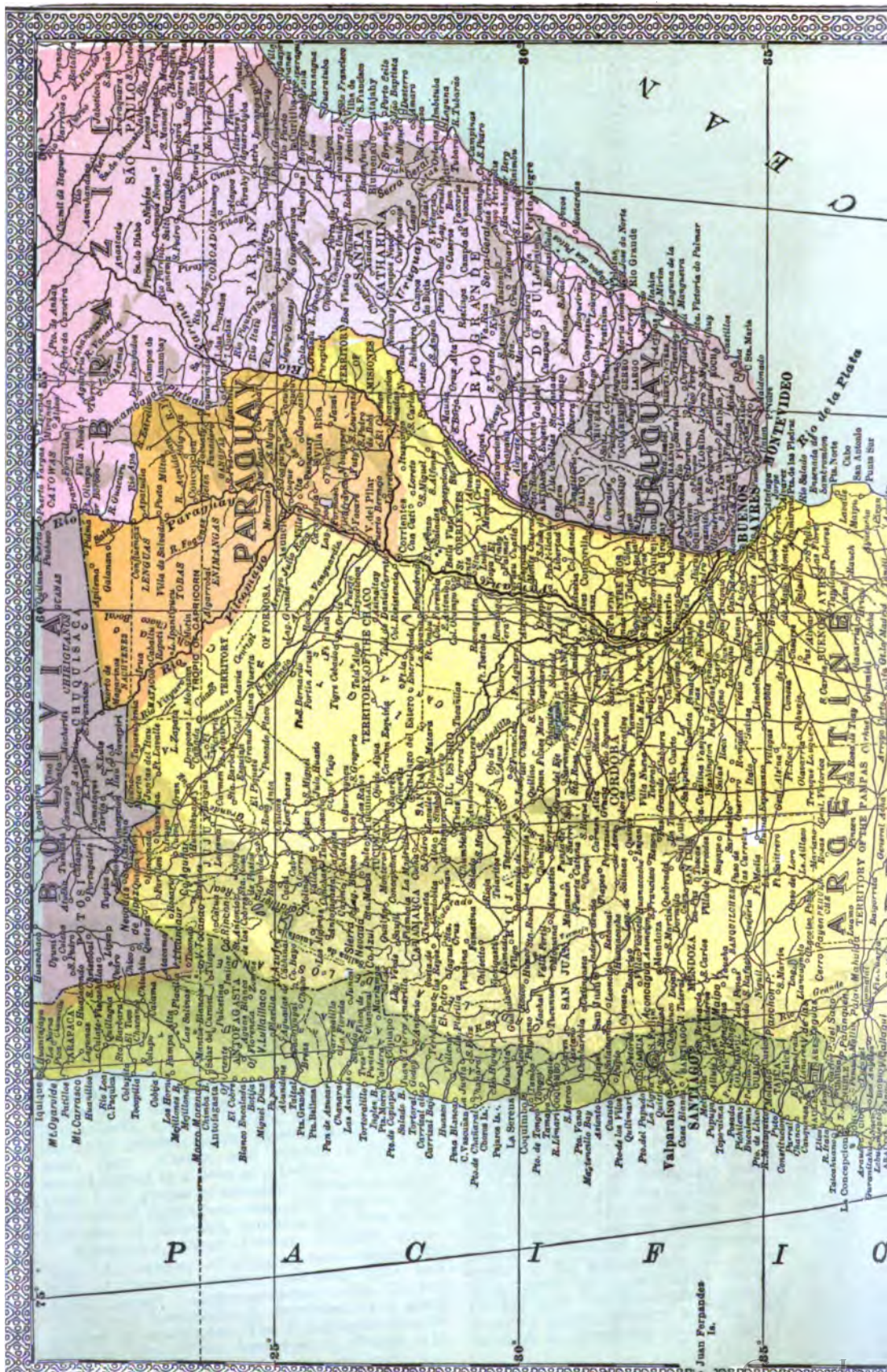
miles. Government telegraph lines extend from Asunción northward to Villa Concepción, and southward to the Argentine frontier, connecting with the lines of that republic at El Chaco. Telephone systems have been established in several of the larger towns. The postal movement is more than 6,000,000 pieces. In 1900 it was about 2,100,000 pieces, an increase in ten years of about 65 per cent.

**Weights, Measures, and Money.**—Arobo = 25 pounds; cuadra = 78.9 yards; league (land) = 4.633 acres; quintal = 100 pounds. Paraguay has no gold or silver coins of its own stamping. The silver *peso* of the other South American countries circulates there, and has the same value as in the issuing country. For value of paper money see below: *Finances*.

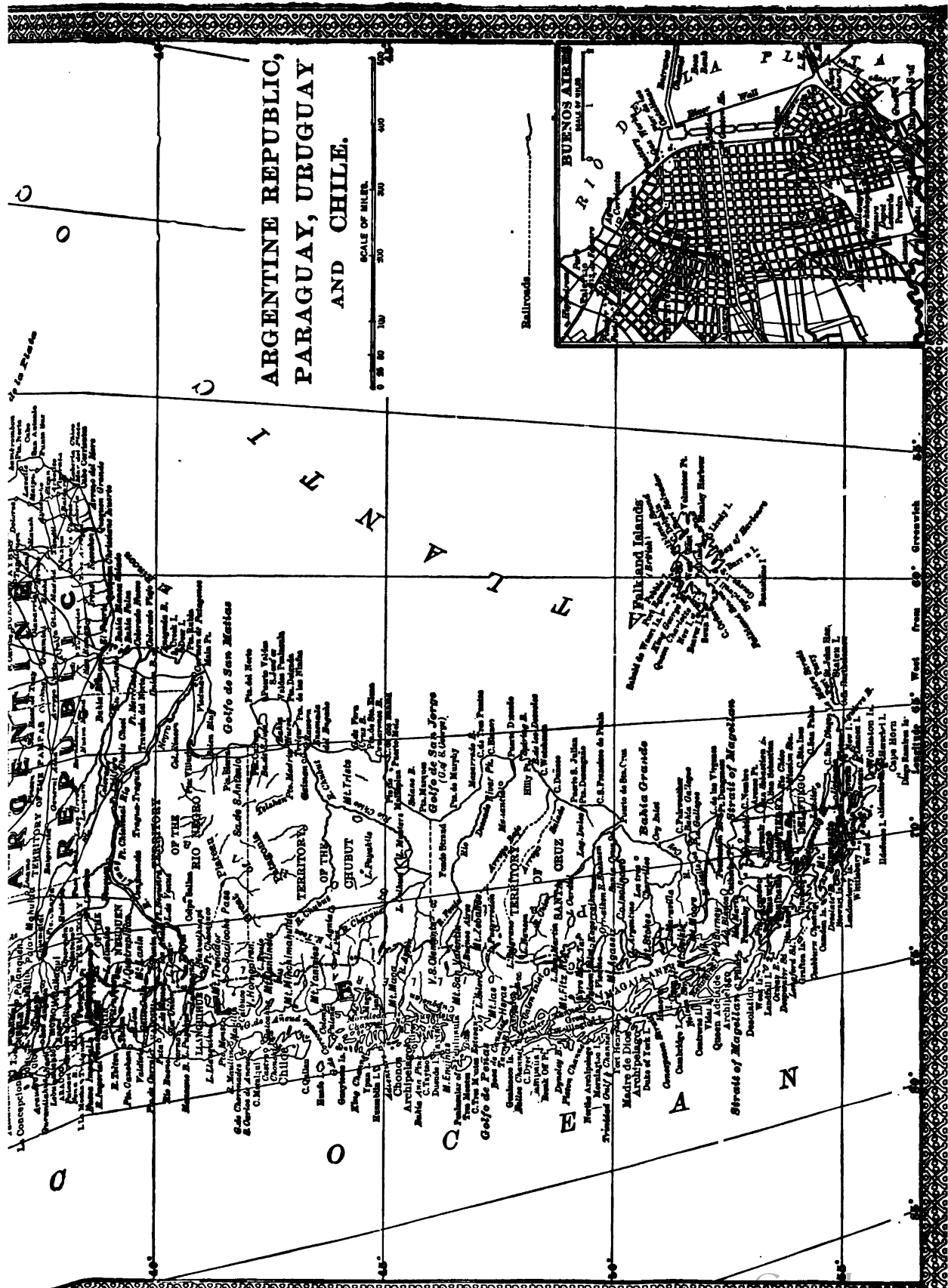
**Government, including Judiciary.**—The constitution of 24 Nov. 1870, now in force, vests the powers of the government in three co-ordinate branches, the legislative, executive, and judicial. The National Congress, consisting of Senate and Chamber of Deputies, meets each year at Asunción. Senators, elected by the people, by universal suffrage, one senator for each 1,200 inhabitants, serve for six years. Deputies, similarly chosen, but in the proportion of one for each 6,000, serve four years. "The executive power," says the constitution, "shall be vested in a citizen, to be called President of the Republic of Paraguay. In case of sickness, absence from the capital, death, resignation, or dismissal of the President, the executive power shall be exercised by the Vice-President." Both president and vice-president are chosen by an electoral college, serve for four years, and "cannot be re-elected except after the lapse of two presidential terms." Numerous provisions of the constitution are designed to guard against the revival of dictatorships, or undue extension of the powers of the executive (see below: *History*). In regard to the cabinet, Article 104 provides: "Five ministers or secretaries, respectively called of the Interior; Foreign Relations; the Treasury; Justice, Worship, and Public Instruction; and War and the Navy, shall attend to the business of the nation, and legalize with their signatures the acts of the President. Those acts without their signatures shall have no efficiency." These Ministers are responsible to Congress. The judicial power is vested in a supreme court, consisting of three justices, and having "the right to inspect and supervise the action of all inferior courts"—that is, in practice, the courts of appeal, and criminal, police, first instance, and justices' courts.

**Finances.**—The government's revenue for 1908 was estimated at 8,062,700 pesos (currency of Paraguay), consisting of revenues from imports to the amount of 1,077,811 pesos, gold, and export taxes, etc., 343,361 pesos, gold, or a total of 1,421,172 pesos, gold (about 10,000,000 in paper dollars, or pesos represented by the currency of Paraguay, gold being at a premium of 850 per cent). Other revenues of the nation (from internal taxes, sale of sealed paper, stamps, patents, mines, etc.) were estimated at 6,641,528 pesos, currency. The receipts of the nation from all sources in 1902 were given at 11,007,222.05 pesos, currency. During 1901 the government redeemed 775,154 pesos of paper currency, and the whole amount of paper in circulation 31 Dec. 1901 represented











## PARAGUAY

only 10,566,171.19 pesos. Expenditures, as shown by the budget for 1908, were: for the legislative department, 759,759; executive department, 231,025; interior department 6,683,864; treasury, 2,573,560; department of foreign affairs, 685,096; department of justice, worship, and public instruction, 6,399,416; department of war and marine, 8,046,187; other liabilities and expenses, 3,516,066; total, 28,894,973 pesos, currency. Prior to the war with the Triple Alliance (see *History*) Paraguay had no debt, either domestic or foreign. Her first foreign loans were negotiated in 1871-2 at London; and on 31 Dec. 1901 the debt thus contracted amounted to \$4,787,077.86. On the same day, the Brazilian and Argentine indemnities, results of the war, amounted to \$9,876,466 and \$9,563,990 respectively. In 1908 the net balance unpaid on the government debt was 4,139,718. The amount was fixed at 4,973,200 in 1895.

**Army and Navy.**—The army (infantry, cavalry, and artillery) in 1910 consisted of 2,000 men. There is a National Guard for service in any emergency. The navy consists of 5 war vessels and transports, some with full complement of guns.

**Population.**—The census of 1908 showed the total population to be 715,841, of whom 20,000 were foreigners. The inhabitants are (1) white people of Spanish descent, or the offspring of Spaniard and Indian, or immigrants who have arrived since 1870; (2) pure Indians, descendants of the aboriginal Guaranies, of which nation only one tribe remains wholly uncivilized; and (3) members of wild tribes inhabiting El Gran Chaco, possibly 100,000 in number. To increase such colonization as that referred to in the second paragraph, the government has offered the following inducements:—Free transportation from Montevideo or Buenos Ayres; entry free of duty of individual luggage, furniture, tools, seeds, and one gun for each immigrant; free lodging and board for five days at the Immigrant Hotel; free passage from Asunción to destination, if on railway or river; a grant of 16 squares of land to each married immigrant at a nominal price—about 8 cents an acre—or of 8 squares to an unmarried immigrant.

**Education and Religion.**—Article 3 of Part I, chapter 1, of the constitution provides: "The religion of the state is the Roman Catholic Apostolic; Congress, however, shall not have power to forbid the exercise of any other religion within the territory of the republic. The chief prelate of the Paraguayan church shall be a Paraguayan." Article 8 declares: "Primary instruction is compulsory," directing Congress to "promote by all possible means the instruction of the citizens." Professors at the university and colleges are appointed by the President of the republic, though nominated by the councils of those institutions. The entire educational system was, from 1609 to 1767, entrusted to the Jesuits; the tendency to nationalize it has grown strong principally during the last 30 years. In all schools the Spanish language is taught, and the Guarani, though still the tongue of the common people everywhere outside of the larger towns, is gradually being displaced; it is even prohibited within the precincts of the university and colleges. The number of schools—normal, high, primary, and private—is 369 (compare NICARAGUA and COSTA RICA), with an aggregate attendance of more than 25,000. A

school of agriculture and five colleges are supported by the government. The National University, founded 1890, has faculties of law and social sciences; medicine; mathematics; and notarial training. Nearly 700 students attend the university and national colleges. There is a national library, containing about 6,000 volumes.

**History.**—Sebastian Cabot, in 1527, explored the Paraná, and sailed up the Paraguay to the mouth of the Bermejo in the following year. Hoping that a passage to the land of gold and silver mines, Upper Peru or Bolivia, would be found in some part of this great river-system (a hope which still leads explorers along the courses of the Pilcomayo and Bermejo), 300 Spanish adventurers, in 1536, proceeded up the Paraguay to the site of the present city of Asunción, where they built a fort. This outpost became a centre of military enterprise, and, after 1609, of missionary work among the natives. The Spanish province of Paraguay embraced the whole region south of the Portuguese possessions in Brazil and east of the Andes until 1617; but when Buenos Ayres was made a provincial capital the jurisdiction of the governors, afterward viceroys, at that city extended over the settlements on the Paraguay and its tributaries, as well as those on the Paraná and La Plata. The Argentine general, Belgrano, incited the Paraguayans to revolt against Spain in 1810. On 14 May 1811 Pedro Juan Caballero with a few companions took possession of the Spanish barracks, and the next day compelled Governor Velazco to divide his authority with two leaders of the revolution. An assembly which began its sessions on 11 June 1811 renounced allegiance to Spain, and this declaration was ratified by the Congress which assembled for the first time on 1 Oct. 1813, and on the 12th vested the executive branch of the government in two consuls, Gaspar Rodríguez Francia, a doctor of theology, and Sr. Yegros. Dr. Francia became dictator (1814-40). After his death the Paraguayans experimented with a government of four military officers, which was superseded by a triumvirate on 23 Jan. 1841; the triumvirate in turn was replaced by two consuls on 12th of March, and next, from 1844 to 1870, the whole power of the state was grasped by Carlos Antonio Lopez and his son and successor Francisco Solano Lopez (see *DICTATORSHIPS IN LATIN-AMERICA*). The younger Lopez made deliberate preparations for a war of conquest. When the time was ripe for action, he issued, through Congress, a declaration of war against Argentina, 18 March 1865. Argentina, Brazil, and Uruguay formed an alliance to oppose him. Paraguay was defeated and almost depopulated in a struggle which ended with the death of Lopez, 1 March 1870. A comparison of the official census of 1857 with that of 1873 shows, allowance being made for increase at the normal rate between 1857 and 1865, that Paraguay lost more than 1,200,000 inhabitants during the war—her entire population, except 28,740 men and 202,333 women and children. It is proper to assume exaggeration in the earlier census, while the later one was undoubtedly defective; but, even so, the disaster must be regarded as the severest that any small nation in recent times has sustained, rising from such a trial still resourceful and independent. To Brazil, Paraguay



## PARAGUAY RIVER — PARALLELISM

ceded the territory on the north and northeast; to Argentina, by the treaty of 3 Feb. 1876, the district south of the Pilcomayo. But the President of the United States, 12 Nov. 1878, awarded to Paraguay the district north of the Pilcomayo, which Argentina claimed (see HAYES, VILLA; also cash indemnities mentioned under subtitle *Finances*).

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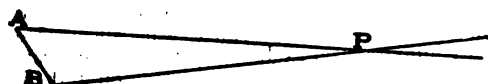
MARRION WILCOX,

Authority on Latin-America.

**Paraguay River**, South America, the largest affluent of the Paraná River (q.v.), with its source in the plateau of Matto Grosso, Brazil, about lat.  $14^{\circ} 24'$  S., near the town of Diamantino. It flows southward through Brazil, forming for some distance the boundary with Bolivia, and enters Paraguay at Confluencia, where the three states meet, then continues the remainder of its course southward through the Republic to which it gives its name. At Tres Bocas on the Argentina frontier the Paraguay flows into the Paraná. Its total length is about 1,500 miles.

**Paraguay or Brazil Tea**, or **Maté**, a tea-like beverage, an infusion of the leaves of several South American species of holly (*Ilex*), prepared by roasting the leafy branches over a wood-fire, then beating them with sticks, and gathering and powdering the fallen leaves.

**Parallax**, a term used in astronomy to designate the displacement in the apparent direction of a heavenly body caused by a change in the position of the observer. Let A and B be two points from which the body P is conceived to be viewed. An observer at A will see the body as if on the celestial sphere in the direction A P. An observer at B would see it



in the direction B P. It is evident that the difference of these directions is equal to the angle at P between the lines A P and B P. It follows that if the length of the line A B, and its direction, are accurately known, and if the observers can determine simultaneously the exact direction in which the body, P, lies, the angle P of the triangle will also be known. Then the distances A P or B P of the body from either of the observers can be computed by trigonometric methods. The following are the principal applications of Parallax in astronomy:

The distance and direction of a planet, or other heavenly body, has to be calculated by the astronomer, in the first place, as if they were measured from the centre of the earth. But the observer is necessarily on the earth's surface. Parallax is then the difference between the direction from the centre, and that from any station which the observer may chance to occupy. The right ascension, declination, and distance of the body will all be different according as it is measured from the earth's centre, or from the eye of the observer. We thus have Parallax in R. A. and in Dec., which

is mostly used in the case of the moon and planets.

**Annual Parallax** is that due to the motion of the earth in its orbit. It is applied only to the fixed stars. By the parallax of a fixed star is meant the difference in its direction, as seen from the sun, and from either extremity of the earth's orbit. It is therefore equal to the angle subtended by the radius of the earth's orbit when seen from the star.

The only method of determining the distance of the heavenly bodies by direct measurement is through observations of their parallax. It is evident that the nearer the body, the greater will be its parallax. Hence, in order to measure a distance in this way, it is necessary to choose the times when the body is nearest to the earth. The moon, being much the nearest of all the heavenly bodies, has the largest parallax of all. Its average value is a little less than  $r''$  (about  $57' 2''$ ); but, when nearest the earth, it exceeds  $1^{\circ}$ . Being so large, even the ancient astronomers were able to measure it and thus determine approximately the distance of our satellite. Measures of the moon's parallax in modern times have been made by comparing its altitude, or declination, as it passes the meridian, at different observatories in the two hemispheres. The Greenwich Observatory and that of the Cape of Good Hope have used their observations for this purpose.

Determinations of parallax can be made without the observer changing his position on the earth's surface, because as the earth rotates on its axis the observer is carried around with it. He thus sees the moon or a planet in different directions, according to the different points of its apparent diurnal course. The general effect of parallax, as we can readily see, is to make the moon or a planet appear somewhat nearer the horizon than it really is. If a body is rising in the east, the change thus produced in its apparent direction from the observer increases its right ascension. In the west the same effect diminishes the right ascension. Thus, by making observations of the moon or a planet in the east and in the west alternately, its parallax, and therefore its distance, can be determined. This change is called the *diurnal parallax*. The diurnal parallax of Mars has thus been determined by various observers. If the position of the sun on the celestial sphere could be determined with the utmost precision, its distance could be measured by its diurnal parallax. But as this luminary cannot be seen at the same time with the stars in its immediate neighborhood, it is not possible to make any very exact determination of the sun's parallax by direct observation. What is done instead of this is to measure the parallax of various planets, using the principles explained in theoretical astronomy. (See ASTRONOMY, THEORETICAL.) In recent times those asteroids which came nearest to the earth have been mostly used for this purpose.

SIMON NEWCOMB.

**Parallelism**, a parallel or comparison used in any sense of the word parallel. By Spinoza the term is used to suggest that every material object has corresponding to it an ideal counterpart. In psychology the word is used of the connection between matter and mind, notably between brain processes and mental processes.

## PARALLELOGRAM — PARAMECIUM

In literature parallelism is a double statement of the same notion, either by simple variation of the idea or by negation in the second member of the opposite of the statement in the first.

**Parallel'ogram**, in mathematics, a quadrilateral rectilinear figure which has its opposite sides parallel. See **GEOMETRY**.

**Parallelogram of Forces**. See **MECHANICS**.

**Parallels**. See **GEOMETRY**.

**Parallels of Latitude**. See **LATITUDE**.

**Paralysis**, a loss of muscular power, whereby contractility is either abolished or greatly diminished. Loss of sensation, general or special, was formerly spoken of as sensory paralysis, to distinguish it from a loss of muscular motion, or motor paralysis. At the present time the term paralysis is usually limited to denoting motor paralysis, and defects in sensation are considered under the head of disorders of sensation.

Palsy is a term rarely used by physicians, but popularly, it is a synonym for paralysis. Paresis is a partial or incomplete motor paralysis, but the term is seldom used by physicians except as referring to a disease of the insane, known also as general paresis (q.v.) or paretic dementia, in which gradually increasing motor paralysis and disorders of sensation are prominent.

Paralysis may affect either the voluntary or the involuntary muscles. It may be limited to one muscle or group of muscles, constituting a local paralysis, or it may involve those of various parts of the body, or nearly all the voluntary muscles, and is sometimes associated with sensory disturbances, such as impairment of common sensation, or alterations in the temperature of the skin. Paralysis is not a disease, but the result of some mechanical obstruction, of some functional disorder or structural damage in the nervous system (to nerves, nerve-centres, nerve-cells or other constituents), or of degenerative atrophy of the affected muscles. As a consequence of the conditions named, either the proper transmission of motor nervous impulses is prevented, or the debilitated muscles are not capable of contracting, though the impulses may be normally transmitted.

If paralysis is long continued, degenerative changes occur in muscular and nerve fibres, resulting in wasting of the parts supplied by the nerves affected, and consequent permanent inability of these parts to perform their functions. Some of the causes of paralysis are: pressure of a tumor, or of a broken bone, as of the skull or a vertebra; an exudation of blood (due to diseased arteries, external injuries, etc.); an embolus; disintegration of nervous tissue by softening or thickening; an accumulation of serum, or other results of inflammation. It may occur without any discoverable lesion, as in hysteric or emotional paralysis, in alcoholic paralysis, in decubitus paralysis, due to pressure on a nerve from lying for a long time in one position, and in temporary paralysis due to drugs or hypnotic or hysteric conditions.

The forms of paralysis are numerous. The names assigned to them usually refer to the situation in the neuromuscular apparatus of the damage, lesion, or defective activity producing the paralyses; to the condition of the muscles affected; or to the extrinsic causes of certain paralyses or the discoverers of those causes.

The forms of paralysis include: Acute ascending (Landry's paralysis), often fatal, beginning in the muscles of the feet and ascending to the other muscles of the body—cause not known; birth, due to injuries at birth; bulbar, due to changes in motor centres of the medulla oblongata; Bell's, a facial paralysis (see **BELL'S PALSY**); central, due to a lesion of the brain or spinal cord; cerebral, due to an intracranial lesion; crossed, paralysis of one side of the face and the other side of the body; crural, chiefly affecting the thigh or thighs; diphtheritic (also post-diphtheritic), a partial paralysis chiefly of the muscles of the soft palate and throat, often following diphtheria; Cruveilhier's, or progressive muscular atrophy; divers', or caisson disease (q.v.); galloping, a rapidly progressive form of general paresis; Indian-bow, paralysis of the thyro-arytenoid muscles; infantile, or poliomyelitis anterior; ischemic, a local paralysis due to a stoppage of the circulation by an embolus, a thrombus, etc.; lead, due to lead-poisoning; multiple, a complication of local paralyses; neural, originating in the nerves; and spastic, a variety marked by rigidity of muscles and heightened tendon-reflexes.

Paralysis is further distinguished with reference to its course, as syphilitic, traumatic, toxic, etc., according to the nerve, muscle, or part specially affected; as, obturator, ulnar, brachial, dental, etc. A paralysis may be reflex, due to peripheral irritation. Monoplegia is a paralysis of a single part of the body; diplegia, a bilateral paralysis, affects like parts on either side of the body.

The two most extensive forms of paralysis are hemiplegia (q.v.), paralysis of one side of the body, and paraplegia, paralysis of the legs and lower part of the body. In both forms there may be a loss of sensation as well as of motion. Although hemiplegia is usually the result of a cerebral hemorrhage or embolism, it may result from lesions of the spinal cord, or as a hysteric complication. Paraplegia is due to some lesion in the spinal cord.

The treatment of paralysis must depend very largely upon the cause, and should be in the hands of a physician, although the patient can assist materially by faithful attention to hygienic measures, and by exerting the will-power upon more delinquent muscles. Passive movements of the muscles by various forms of massage and the use of electricity are of value, but must be carefully employed, or they may do harm.

**Paramaribo**, pâr-a-mâr'î-bô, Dutch Guiana, South America, the capital of the colony, on the west bank of the estuary of the Surinam River 16 miles above its outlet on the Atlantic Ocean. It is a well laid out town with substantial buildings, and an excellent harbor defended by two forts. The whole trade of Dutch Guiana centres in Paramaribo.

**Paramat'ta**. See **PARRAMATTA**, NEW SOUTH WALES.

**Parame'cium**, or **Slipper Animalcule**, an oval, flat infusorian very common in pond water or in vegetable infusions. Each paramecium is covered with rows of cilia which lash it through the water and drive food-particles into an aperture which serves as mouth. As the food-particles enter they take bubbles of water with them, and are moved round and round in the

## PARAMETER—PARANAHYBA

living substance until they are digested or got rid of. There are two (excretory) contractile vacuoles; the large nucleus has a small one (paranucleus) lying beside it; beneath the thin rind there are remarkable eversible threads. A paramecium often divides transversely into two; these two repeat the process, and with continually diminishing size rapid multiplication may thus proceed for a while. It has its limits, however, and then two individual Infusorians conjugate, exchange some of the material of their paranuclei, and separate. Thus they seem to renew their youth. See INFUSORIA.

**Param'eter**, in mathematics, a term applied to a constant quantity entering the equation of a curve. The term is principally used in discussing the conic sections.

**Paraná**, *pā-rā-nā'*, state of the Brazilian Confederation, bounded on the north by São Paulo, on the east by the same state and by the Atlantic, on the south by Santa Catharina and the northeastern tip of Argentina, and on the west by Paraguay and Matto Grosso. The main northern and western boundary is the Paraná (and the Paranapanema); and the Iguassú forms the greater part of the southern boundary. The Ivahy and Piquiry flow northwest into the Paraná; but, like the Iguassú, they are filled with rapids and unfit for navigation. The short coast line has the excellent harbor of Paranagua; and the coast is picturesque, but hot, humid and fatal with its yellow fever. In the forest-covered interior, which is only partially explored the climate is more equable and much cooler; the temperature averages about 17° C., with a winter mean of 14° and a summer mean of 18°; and the rains are abundant. Manioc, Indian corn, coffee, and cotton grow on the coast; and the cereals and fruits of the northern and central United States in the interior. There are valuable (but unexplored) supplies of iron, mercury and gold. The port of Paranagua is connected by a railroad with the capital city of the state, Curitiba. The area is 85,430 square miles and the population, largely increased by German and Polish immigration, is nearly 300,000. Consult Lange, 'Südbrasilien' (1885).

**Paraná**, or **Bajada** (*bā-hā-dā'*) **del Paraná**, Argentina, capital of Entre Rios province, on the left bank of the Paraná, the terminus of a branch railroad from Concepción. It is connected by daily steamer with Santa Fé on the west bank of the Paraná. It is well laid out, with straight unpaved streets, telephone and street car service, and other modern improvements. The city was founded in 1730; was the federal capital 1852-61; and has steamship connections with Buenos Ayres; many ocean steamers come up the Paraná as far as this. But the city is not so prosperous as it was 50 years ago. Pop. (1895) 24,261.

**Paraná**, the second largest river of South America, with a length greater than that of the Mississippi and a drainage area nearly as large. It is the principal tributary of the great estuary called the Río de la Plata, which it forms by its juncture with the Uruguay. The Paraná itself is formed by the confluence of the Parana-hyba, which is sometimes considered its upper course as being the axial stream, and the Río Grande, the true upper course. The latter rises

only 60 miles from the coast on the west slope of the Sierra de Mantiqueira, near Itatiaya; flows east across Minas Geraes; separates that state from São Paulo; and receives the Sapucahy and the Mosy-Guassu before its juncture with the Parana-hyba (q.v.) at the meeting point of Matto Grosso, Minas Geraes and São Paulo. The Río Grande itself is sometimes called the Pará or Paraná, but the latter name is more properly used of the double stream, which flows southeast across the Brazilian plateau with several splendid cataracts and many great rapids, the most notable being at Salto Guaira, the beginning of the river's middle course, in which it is the boundary between Brazil and Paraguay, and then between Paraguay and Argentina. It joins the Paraguay River (q.v.) just above Corrientes, which takes its name from this juncture, and then flows a little west of south through Argentina, turning to the east at Rosario, and a few miles above Buenos Ayres joining the Uruguay. In general the upper course of the Paraná is navigable save at the falls of Urupunga and Guaira and at the rapids extending 150 miles below Guaira; most of its minor tributaries join it with cataracts, that of the Iguassú, which, apart from the Uruguay, is nearly the only affluent from the left, being the most majestic. Through the Argentinian plain the river is broad and easily navigable; near the embouchure there is a constantly shifting delta, the main difficulty in navigation. Ships of 4,000 tons easily make their way 400 miles from the ocean to Rosario. Smaller vessels, with draft of 6 or 7 feet can go as far as Corrientes at any season and at high water to the juncture of the Iguassú. The depth of the river varies greatly with rains and melting snows, and the volume is much greater at Corrientes than below. The Paraná is 2,720 miles long from its source to the Plata. Consult Hutchinson, 'The Paraná' (1868).

**Paranagua**, *pā-rā-nā-gwā*, Brazil, port of the state of Paraná (q.v.), southeast of Curitiba, the capital, and on the southern side of the Gulf of Paranagua, which is navigable for vessels of 300 to 400 tons and is separated from the Atlantic by the Ilha do Mel. Railroads built by French enterprise connect the city with Curitiba and with the harbor at Antonina; and there is regular steamboat connection with Hamburg, because of the German colonists in the state and the valuable exports of maté (averaging 50,000 tons annually), hardwoods, cereals, and sugar. Pop. (estimated) 6,000.

**Paranahyba**, *pā-rā-nā-ē'ba*, or **Parnahyba**, *pār-nā-ē'bā*, Brazil, (1) a city and seaport of the state of Piahy, on the river of the same name, about 10 miles from the coast. It is an unhealthy town, but of importance as the seaport for the region. It ships cattle, hides and cotton. Pop. (estimated) 12,000. (2) A river of northeastern Brazil, rising between the Serra das Mangabeiras and the Serra Gurgueia, and forming the boundary between Maranhão and Piahy. It is more than 630 miles long, has no rapids in its course to the northeast, and is navigable for 400 miles. It empties into the Atlantic through six mouths, forming a large delta, to the east of which is the city of Parana-hyba (q.v.). The affluents of the river are the Gurgueia, Piahy, Poty and Longa from the

## PARANOIA—PARAPET

right, and the Balsas on the left. (3) An affluent of the Paraná (q.v.), rising on the boundary of the states of Goyaz and Minas Geraes in the Serra dos Vertientes. It forms the line between the two states mentioned, receives at the left the Velhas and the Tepico rivers and on the right the Corumba and the Meia Ponte, and joins the Rio Grande de Paraná (or Paraná), with which it forms the upper waters of the Paraná (q.v.). The Parahyba occupies the axis of the Paraná basin, but cannot be reckoned the true headwater of the Paraná because of its short course and small volume of water as compared with the Rio Grande. Above its juncture it forms several cascades and rapids. It measures altogether more than 520 miles.

**Paranoia**, one of the types of the insanities. It is characterized by a marked hereditary predisposition, a slow development of persecutory ideas, almost from childhood, with increasing inability to get on in the world, and it usually terminates in a mild type of mental disintegration. Its subjects are the people with mental twists. The disease is one of great importance, and yet the conduct of those affected is often so closely allied to the normal conduct of the environment that it becomes extremely difficult to come to the decision of mental irresponsibility in many of these cases. Although a rare disease, it is particularly important to recognize it, since paranoics are often very dangerous lunatics. The murderer of Garfield was an example. A typical case usually starts wrong in the world, with a mental instability inherited from intensely neuropathic parents. Some type of insanity, or extremism, or pronounced crankiness, or violent temper, is present in the ancestors of most of these cases. Throughout the developing period these children are different from other children; their intellects may be as bright as others; very often they are precocious, but irregularly so, being generally below par; they are apt to be less gay, less expansive; are characteristically introspective, egoistic, frequently very egotistic, and inclined to live within themselves. They think that their parents are less fond of them and show favors to their brothers and sisters. They thus come to be very subjective and live in a realm of fancies and ideas, are notoriously poor observers of fact as entities, and poor scholars in the exact sciences. If they are recognized as defective in these early stages much may be done for them by appropriate training. After reaching years of independence these patients find it difficult to get along with people. They are suspicious and quarrelsome, and soon come to believe that they are the objects of special plots and persecutions. The early childhood ideas may be a nucleus for this delusion. This false interpretation of conditions about them becomes more and more fixed in their minds until it is systematized, and everything is woven into the fabric of this belief. Many persist in this state for years. They may be engaged in business; they are often found among the people of "artistic temperament." Here their eccentricities, if coupled with a small modicum of talent, are put up with, and they go along as actors, painters, musicians, writers, inventors, etc., earning perhaps a bare living, or being half supported by friends, while they are laying the foundations of a "career." Often the ideas of persecu-

tion lead to the development of intense hatred, it may be of an individual as a personal oppressor, or as a hindrance to the cause of truth, of liberty, of freedom, etc. It thus comes about that many paranoics are attracted by the doctrines of anarchy, and it is notorious that regicides are prominently represented in this diseased type. Many of these patients suffer from hallucinations; they see faces, hear voices plotting against them, etc. Sometimes these voices seem to accuse them of immoral acts. From ideas of persecution they often graduate into ideas of grandeur (see GENERAL PARESIS). Sometimes the voices appear to tell one of these that he is elected by God to be the savior of his people, and in response to either set of hallucinations he may kill. Mystico-erotic ideas are very frequent in women of this nature, and many are found studying Oriental philosophies and mystic symbolisms from fakirs who hold their hands and teach them breathings and various forms of massage—all of which contribute to their erotic tendencies. One feature is very characteristic in this disease—its oneness. On many of the topics of general conversation the paranoic is rational and often a charming talker; but touch the core of his delusional state and he is transformed. Some part of his brain necessary to bring about mature judgments along certain lines is defective. This defect has never yet been seen by the microscope, but there seems to be little doubt that there is some organic brain-defect. Most of these cases are hopelessly incurable. A few remit, are apparently self-controlled for a time, and then develop. The majority go on to a mild form of dementia, but the breakdown is very slight, although the delusions usually persist and dominate the patient's whole thought and actions. These patients are best confined in sanatoriums. They are nuisances to all, and are better under the strict regime of an institution. Much can be done by early individual training to render these defectives self-supporting. When able to take care of themselves or when wealthy by inheritance, they may be regarded as incorrigible cranks, but still, bearable; but as dependent they are impossible. Medico-legally these cases are among the most interesting. Consult: Kraepelin, 'Psychiatrie' (7th ed. 1904); Ziehen, 'Psychiatrie'; Ballet, 'Traité de Pathologie Mentale' (1904); Berkeley, 'Mental Diseases'; Maudsley, 'Pathology of Mind.' See DEGENERACY; DEGENERATION; GENERAL PARESIS; INSANITY.

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**Paran'hracene.** See ANTHRACENE.

**Par'apem,** in ancient times, the name given a tablet fixed to a pillar or wall, and on which laws and proclamations were engraved.

**Par'apet,** (1) in fortification, a work, usually of earth, intended to protect the troops within the ramparts, as well as the pieces of artillery used in the defense. It has three sloping surfaces, an outer, upper, and inner; but the upper surface slopes only very gently downward and outward. It is intended for the defenders to rest their rifles or muskets on when firing. The defenses round the roofs of castles are also called parapets. (2) In architecture the term parapet is applied to the structures

## PARAPLEGIA—PARASITISM AND ANIMAL PARASITES

placed at the edges of platforms, balconies, and roofs of houses, to prevent people from falling over.

**Paraple'gia.** See PARALYSIS.

**Par'asang** (Gr. *παράσας* from Persian *parsang*, or *farsang*), the denomination of a lineal measure among the Persians of antiquity, and still used by them. In Xenophon's account of the Retreat of the Ten Thousand he gives the length of each day's march in parasangs, and modern travelers agree with the estimate he makes of its length, namely, about 30 Greek stadia. Herodotus makes about the same estimate, which in English miles would be a little less than  $3\frac{1}{2}$ . Strabo, the geographer, reckons it as an arbitrary measure of 30, 40 or even 60 stadia, and the nature of the ground traveled over may sometimes have had some influence in determining the question. The derivation of the word, which means "stone-at-the-end," points to the fact that the Persians, like the Romans, marked out their great highways by means of stones, inscribed with the distance in one case from the Persian capital, in the other from the "golden milestone" (*milliarium aureum*) which Augustus set up in the Forum near the temple of Saturn.

**Par'asele'ne**, in astronomy, a mock moon, not unlike the Parhelion, or mock sun. The Paraselene is common in the polar regions. See HALO.

**Parasitic Fishes**, about a dozen very small eel-like fishes, of the sand-eel family *Ophidiidae*, and the genera *Fierasfer* and *Encheliophis*, are parasitic or commensal in other marine animals, and have some curious modifications. They frequent the hollows in the bodies of jellyfishes, the breathing chambers of starfishes and sea-cucumbers, and sometimes insinuate themselves between the layers of the mantle of pearly mussels and other bivalves. Cases are known where they have become coated over with pearl and so imbedded in the interior of the shell. These parasitic fishes have totally lost their pelvic and caudal fins; and the vent has been moved forward from the ordinary anal position to near the throat. One species (*F. affinis*) is especially common on the pearl-oyster banks of western Mexico. Consult: Günther, 'Study of Fishes' (1880); Putnam, 'Proc. Boston Soc. Natural History' (1874).

**Parasitic Plants**, plants which live upon and at the expense of other plants to which they become attached. The group is not well defined, since many of the lower forms have saprophytic habits also, or may develop them under favorable conditions and since some higher plants exhibit more or less parasitic tendencies. All members of the group are alike in their method of feeding; sucking organs (haustoria) are developed within the host-plant's tissues, their office being to absorb the liquids which the host-plant obtains from the soil and the food elaborated by the green parts of the host. It is assumed by botanists that this habit has resulted in sexual degeneracy, so that in some cases sexuality appears to have been lost entirely. As a consequence of this the vegetative functions are in many cases remarkably developed. In other cases the life-history is remarkably complex, especially among the lower fungi, for instance, apple-rust. (See APPLE,

paragraph *Diseases*.) The flowering parasitic plants may or may not contain chlorophyll, in the former case being able to utilize the carbon dioxide of the air in the manufacture of a part at least of their food; in the latter case being dependent nearly if not entirely upon the host. Familiar instances of the former are bastard toad-flax and mistletoe; of the latter, broom-rape and dodder. This last (see DODDER) is remarkable also because its seeds germinate in the ground, send up slender leafless, thread-like stems, and after becoming attached to a host die at their lower extremities. Single individual plants of some species of dodder have been known to feed upon more than half a dozen different species of host-plants at the same time. From an economic standpoint, the parasitic fungi are of most importance. Among these are the so-called plant diseases; for instance, the smuts and rusts of cereals, the blight of strawberries and potatoes, the mildew of gooseberries and grapes, etc. There are also several diseases attributed to bacteria; for instance, pear blight, and melon wilt. Still other members of this group are parasitic upon insects. The common house fly is frequently found stuck fast to walls and windows and surrounded by a yellowish ring of spores of a plant parasite. Young fish in hatcheries are often destroyed in immense numbers by a slime mold. Horses occasionally suffer from a lung parasite of vegetable origin. And even man is not exempt; he is sometimes attacked by ringworm and barber's itch. The attacks of these parasites are due largely, if not wholly, to unsanitary conditions, carelessness, neglect, or some other similar cause and they may be prevented by proper attention.

**Parasitism and Animal Parasites.** Any organism which obtains its nourishment at the expense of some other living thing and yet so gradually as not to destroy its life at once, may be regarded as a parasite. The line of separation between parasitic and carnivorous species is, however, by no means distinct. One finds forms such as some small leeches, which devour bodily small aquatic animals, but when favored by opportunity extract the blood of larger species, being thus under different circumstances parasitic and carnivorous. It is evident that those organisms which have the parasitic habit, may be either plants (phytoparasites), or animals (zooparasites); equally also the host, that is, that form which is parasitized, may be either plant or animal. Among phytoparasites there are many forms such as the rusts which attack crops, the blights on fruit trees, the fungus causing decay in a tooth, and the bacteria which are responsible for consumption or cholera; but this article will be confined to a discussion of general principles, as illustrated by the animal parasites.

**Origin of Parasitism.**—A wide range is exhibited by various forms, both as to the degree of parasitism and as to the direction the organism has followed in acquiring the parasitic habit. The temporary parasites, such as mosquito, bedbug, or leech, are most independent of all. They remain with the host merely long enough to secure a single meal, and in most respects manifest the characteristics of free-living organisms, while their immediate relatives are carnivorous or carrion feeders. Extreme instances of temporary parasitism result in the

## PARASITISM AND ANIMAL PARASITES

permanent acquirement of the parasitic habit; thus the so-called sheeptick (*Melophagus ovinus*) is really a highly degraded fly, and not at all intimately related to the ticks. Intermediate between the forms just mentioned stand others like the flea, which can change their hosts and yet possess a structure which, by the loss of wings and the development of leaping and grasping organs, has been more highly modified in the direction of parasitism. This modification goes still further in the case of the lice, which are without special means for effecting a change of host and are usually regarded as stationary parasites.

Another line which indicates the origin of parasitism may be followed through a series of organisms which are ordinarily free-living forms, but which under exceptional circumstances gain entrance to the alimentary canal, for example, and live there under conditions but little removed from those which their natural habitat furnishes; thus Schaudinn has called attention to the ease with which slime-inhabiting species of microscopic animals, especially protozoans, may accidentally gain access to the alimentary system of man, and find there conditions such that they may indefinitely continue their existence. Small roundworms (*Rhabditis nigrovirens*) thrive apparently equally well in the mud or in the lung of the frog, although the method of reproduction becomes modified in the second instance.

The relations of animals to one another show also many degrees of dependency which suggests another line of origin for the parasitic habit. In the simplest case of dependency the weaker form receives shelter or even only transportation from point to point. Such are the conditions for those forms which take up their abode upon floating objects in the water, the backs of whales, or the outer surface of the shells of crabs and mollusks. Some, indeed, seek more sheltered positions, as for instance among the windings of a snail's shell or within the mouth of the whale. In the latter case the animal secures not only the best of protection but is able to pick up stray morsels of food as well. The dependent secures board as well as lodging from the host, and the relation is known as commensalism (q.v.). In some instances, however, it may be of mutual advantage, and some return may be rendered for the services performed. In the latter case the relation is known as mutualism, or symbiosis. The association here is well illustrated by that of the anemone which is regularly found attached to the shell of a hermit-crab. The anemone secures transport from point to point, greater freedom from injury, together with less dependence upon environment, than is ordinarily true of sessile organisms, while at the same time it appropriates stray morsels which fall from the jaws of the crab while feeding. On the other hand, its presence on the shell favors the concealment of the crab, and its stinging tentacles ward off possible attack. The advantage of the association is demonstrated by the solicitude with which the hermit-crab transplants the anemone when forced by growth to take a new shell for its habitation.

Diametrically opposed to this mutual advantage which has grown out of the association of lodgers and messmates, is that in which the

return is purely one-sided, namely, true parasitism. The parasite lives at the expense of his host without rendering any service in return, and yet with such prudence as not to endanger the life of his supporter until at least his own life-history is completed. The precision of the relation is evinced for instance by the life-history of the ichneumon-flies. The eggs are deposited in cases on the backs of caterpillars; the larvæ penetrate the body of the latter and, beginning with the least important organs, devour the tissue of the host until with its complete destruction each larva is ready to metamorphose into the fly. It is but a short step from the position assumed by some lodgers in the mouth-cavity to that taken by most parasites in some region of the alimentary canal, or in one of the various organs connected with it; and yet the transition is not always to internal parasitism (endoparasitism). Existence on the external surface of the host, which distinguishes the ectoparasite, though rarer on account of the greater dangers involved, presents examples of an equally intense parasitic habit. Beneath the abdomen of the crab occurs often a curious sac-shaped body (*Sacculina*) which is a near relative of the barnacles, a group of typical sessile forms. The relationship is little evident from the inspection of the adult, but is clearly demonstrated by study of the life-history. The young organism settles down on the crab, similar in form and development to a young barnacle, but develops organs of attachment which ramify through the body of the crab as do the roots of a tree through the soil, and are the sole means of obtaining nourishment. Accompanying the assumption of the parasitic habit, comes the striking degeneracy of organs connected with the active life and the development merely of the reproductive function. The adult *Sacculina* consists of little more than a mass of reproductive organs producing large numbers of eggs.

*Effects of Parasitism.*—The effects of parasitism, which are dependent upon the degree to which the animal has acquired the parasitic habit, are equally evident and similar in parasitic forms, whatever their line of origin. The organs and function of locomotion are the first to suffer. Adult parasites possess little if any means of movement and such locomotor organs as are present in the embryo, and are related to a period of free existence or to a change of host, disappear with the attainment of the adult location. Hand in hand with the degeneration of the locomotor organs goes the reduction in the muscular and nervous systems. Organs of special sense, also, become atrophied or are entirely lost, and the parasite is degraded to the level of a mere vegetative organism by the disappearance of these characterically animal structures.

On the other hand, while the parasitic life is an easy existence, it is equally a dangerous one for the species. Were the eggs to be deposited and the young developed at the point where the adult lives, the existence of the parasite and its host would find an evident and not distant limit. The necessary migration to the external world, and search for new hosts involve large elements of chance. Thus for the preservation of the species a superabundant fecundity is required to meet these overwhelm-



## PARASITISM AND ANIMAL PARASITES

ing odds." In conformity to this the reproductive system of the true parasite reaches an extraordinary stage of development, and produces an enormous number of offspring. It is noticeable that the same changes are brought about in the worm and in the crustacean. Unlike as they are at the start parasitism has degraded them to the same physiological level. Those organs which characterize the animal are lost and there remains merely a superdeveloped reproductive system. It is wise in this connection to emphasize the fact that the parasites do not constitute a group of systematic value. The forms are classified in distinct and separate branches of the animal kingdom, and a given parasite is often more closely related to free-living species than to other parasitic forms. The majority of animal parasites occur to be sure among the lower groups so that the single-celled animals (Protozoa), the worms, and the Crustacea, furnish the larger number of parasitic animals, although instances of parasitism are not wanting in higher groups, even among the vertebrates.

Parasites do not originate in vitiated organs, as the ancient worthies of medicine would have it, nor are they the result of any peculiar temperament, as another school has held in time past. They have been introduced into the body of the host from without, and are found in a given location because the germs or embryos were brought to that point by some chance, and have maintained it during growth. The method of cure is equally evident. No amount of imagination can compass it, for it depends upon the removal of the parasite and the prevention of the introduction of further germs or embryos. The same line of reasoning applies with equal distinctness to other diseases, and if followed will materially aid in dispelling many popular illusions of the day on medical subjects.

**Endoparasites.**—The endoparasites of man have been centres of attention during recent years by virtue of discoveries which have demonstrated their importance in the etiology of disease. To be sure the occurrence of tapeworms, and of the larger roundworms, is recorded in the first medical writings of the Greeks, and also in the still earlier chronicles of the Hebrews and Egyptians, and in a few instances their relation to disease was accurately stated. Now more than 100 species are recorded for the human host, and the discoveries of recent years have been particularly fruitful among the lower groups of these organisms. For instance, it is now known beyond question that a small parasite in the red corpuscles is the cause of malaria (q.v.), one of the most widespread and costly of human diseases. Quite recently also smallpox, yellow fever, and a number of tropical diseases of considerable importance have been attributed to the presence of other minute animal parasites. Although not yet demonstrated it may well be that the causes of many infectious diseases which have hitherto been sought in vain among the bacteria, are eventually to be found among microscopic animal parasites.

In the opinion of the medical profession 200 years ago there was no disease, real or imaginary, which was not due to the presence and effect of some kind of parasite. More careful study has shown the extreme character of this

view, and has given some insight into the actual effects of the parasite upon the host. In general such effect is related to the proportional size and number of the parasites, although there is an evident difference between such parasites as are active and growing, and those which are encysted and passive. The draft on the host is first for food supply, which evidently depends upon the size and fertility of the parasite; in the second place upon the amount of space occupied, which will be of importance only where the number of parasites is large or the space occupied is limited; and in the third place, active parasites produce by their movements a certain irritation and inflammation of the tissues of the host. Certain species which actually devour the tissues of the host introduce an element of danger in the destruction of essential organs and through weakening the walls of blood-vessels or perforating the intestinal canal, so that the secondary consequences may be entirely out of proportion to the actual destruction caused. Excessive effects are, however, due to more intricate causes. The extreme anæmia which is consequent upon the parasitism of certain species (*Uncinaria americana*) is due to the constant abstraction of blood by the parasite, and the consequent great reduction in the vitality of the host. The injuries caused in the intestinal wall afford places of easy attack for pathogenic germs which may be present. Many investigators have also shown that certain species of parasitic worms produce definite poisons (toxins) which affect particularly the nervous system and the formation of blood. The continued production and giving off of such substances explain the apparently excessive results of parasitism, and the production for instance of pernicious anæmia by certain tapeworms, such as *Dibothriocephalus*.

**Causes and Results.**—The life-history of the parasite is intimately connected with the habits of the host, and frequently includes alternation of generations in that one generation is passed within the host and another either outside as a free-living organism or in a different host; or it may be that the larval form occurs in one host, while the adult is found in another. Thus the larval form of one tapeworm occurs in the mouse, and the adult is found in the alimentary canal of the cat. The complications which occur are too extensive to permit of detailed consideration here, but the relation of the two hosts is regularly such that the transition from one to the other is achieved by natural means. The life-history gives a clue to the means by which the parasite gains introduction to the host, and in the absence of knowledge concerning the development it is difficult if not impossible to say at what point the evil may be combated. A rational prophylaxis for malaria was not given until the life-history and the method of introduction of the parasite into the human host were laid bare. In general the causes of human parasites are to be found in the disregard of personal cleanliness on the part of the individual, in too intimate association with pet animals, from which come a number of important parasites, in the contamination of the water-supply by sewage or waste, in lack of care in the preparation of food, and of course, frequently in the element of chance.

The change to communal life led to a large

## PARASOL—PARCELS POST

increase in the number of human parasites and to frequent epidemics, for which an impure water-supply was principally responsible. The development of municipal sanitation, and greater care for personal hygiene, together with the employment of footgear and less intimate association with domestic animals, are constantly tending to reduce the number. The use of good food is an influential factor as is also greater care in the slaughtering of animals and in the raising and distribution of food products in general. The determination of a rational hygiene and its application by the individual are destined to accomplish much toward the limitation of parasitism and of the diseases consequent to it. National prejudice or established custom may temporarily retard the introduction of necessary measures, but general intelligence will ultimately succeed in reducing to their lowest terms the parasitic infections of man and the domestic animals.

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**Parasol**, an umbrella or covering for the head, which was used among the ancients, not for the purpose so much of preservation from the rays of the sun as in religious ceremonies and processions. In certain festivals the young females who celebrated them bore, among other sacred instruments, the parasol: it was, in fact, one of the most ancient marks of dignity that we find indicated either by relics of art or by authors. In process of time, when the Romans began to lay aside the simple habits of their forefathers, the parasol, by a natural transition, began to be used for the purpose to which it is still applied. The matrons particularly used to be followed by slaves, whose office was to protect the delicacy of their charms by intercepting the solar heat by the agreeable shade of the parasols. They were constructed of wands or twigs, disposed in such a manner as to admit of their being put up or down, in much the same way as those used at the present day. See **UMBRELLA**.

**Parasu'chia**, an order of extinct crocodiles. See **HERPETOLOGY**.

**Paray-Le-Monial**, pä-rä-le-mö-në-äl, France, town in the department of Saône-et-Loire; on the Bourbince; about 170 miles in direct line southeast of Paris. It is one of the oldest towns in France, and is famous for having been the home for many years of Margaret Mary Alacoque, a Visitation nun, who gave the world an account of remarkable revelations made to her regarding the devotion to the Sacred Heart of Jesus. To this nun may be given the credit, in a great degree, of the present magnitude of the League of the Sacred Heart (q.v.). She died at Paray-Le-Monial 17 Oct. 1690. Pop. (1901) 4,362. Consult: Tickell, 'Life of Blessed Margaret Mary'; Bougand, 'Histoire de la bienheureuse Marguerite Marie' (1894).

**Par'buckle**, a method of raising or lowering any cylindrical body, such as a barrel, by an inclined plane. It consists in throwing a rope round a post fixed on the level from which the object is to be lowered, or to which it is to be raised, making the ends of the rope of the same length and passing them under and round the object to be raised or lowered. In raising or lowering the object one or more men, standing on the higher level, take hold of each end of the rope, and shorten or lengthen the amount of rope paid out according as they wish to raise or lower. By this method the barrel, or whatever else it may be, is made to serve as a pulley for itself. The resistance at the two ends of the rope is just one-half of the weight of the object as felt on the inclined plane, or one-fourth of that weight at each end separately.

**Parcæ**, pär'sê. See **FATES**.

**Parcel** was formerly used as an adverb or semi-adverb, having the meaning of "partly" or "in some measure;" as in the expressions "parcel-blind," "parcel-deaf," "parcel-gilt," or "parcel-learned." In the law of real estate and conveying of property, the word is used for a portion of land named in the transaction of buying or selling, and so also of a description of property set forth in a conveyance, together with its boundaries, with a view to its easy identification. In nautical usage, a parcel is a wrapping of tarred canvas on a rope, to prevent chafing. It is cut in long, narrow strips, well tarred, and made up into rolls before it is laid on the rope. The rope is usually warmed, then **parceled**, and then **served**.

**Parcels Post**, *United States Domestic*. Though seriously restricted in its early days by the three pound weight limit and the high rates of its sealed parcels service varying from 24 cents an ounce for distance up to 30 miles, to \$1 an ounce for over 400 miles, the United States post-office has always been a merchandise service.

As early as 1851, when the old, complicated six zone service was reduced to two zones at rates up to 3,000 miles, of 3 cents per half ounce, (greater distances 6 cents) the records of the dead letter office at Washington show that silks, laces, jewelry and other merchandise of large value in small bulk were frequently transmitted by letter or sealed **Parcels Post**, and today the extent of the transportation of merchandise by first class mail is simply a matter of rates. The transmission of merchandise in

## PARCENARY — PARDEE

unsealed postal parcels — the so-called Parcels Post of our day — was inaugurated by Abraham Lincoln and the Congress of 1863 when our modern flat rate post-office was established. Lincoln's flat rate Parcels Post covered only a few articles in parcels up to 12 ounces, but the Congress of 1874 extended the service to all kinds of merchandise in parcels up to four pounds at 1 cent each two ounces, 8 cents a pound.

Within nine months after its establishment, however, Senator Hannibal Hamlin of Maine, succeeded in placing a rider upon the Postal Appropriation Bill then before the Senate increasing the 1 cent two ounce parcels rate of 1874 to 1 cent an ounce, or 100 per cent increase, and it was accepted by both Houses of Congress without debate, and this is the present general parcels post rate.

Later, printed books, circulars, and seeds, bulbs, etc., for planting, were given the old 1 cent two ounce rate of 1874, thus dividing the common merchandise service into two classes. As early as 1891, Postmaster-General Wanamaker strongly advocated the consolidation of these classes of merchandise into mail matter at the old common rate of 1874, and succeeding postmaster-generals continued to urge the same reform upon Congress for many years, but without avail.

The Sixty-Second Congress, on 24 Aug. 1912, passed a revised Parcels Post Bill embodying a zone system of postal rates according to certain prescribed distances from a given territorial centre, known as the Bourne Parcels Post Law, to take effect 1 Jan. 1913, somewhat similar to that of the law of olden time, on the ground that it would be more equitable to the public and less costly to the Government than the extension of the existing flat rate system. This law is based on quadrangles 69 miles long, 54 miles wide, and may be summed up as follows:

Any article is mailable if not over 11 pounds in weight nor more than 72 inches in length and girth combined, nor likely to injure the mails or postal equipment or employees.

Flat rate of 1 cent per ounce up to 4 ounces regardless of distance.

Above 4 ounces, rates are by the pound or fraction thereof, and varying with distance, as follows:

	First pound	Each additional pound	Eleven pounds
Rural route and city delivery.	.05	.01	.15
50-mile zone.....	.05	.03	.35
150-mile zone.....	.06	.04	.46
300-mile zone.....	.07	.05	.57
600-mile zone.....	.08	.06	.68
1,000-mile zone.....	.09	.07	.79
1,400-mile zone.....	.10	.09	1.00
1,800-mile zone.....	.11	.10	1.21
Over 1,800 miles.....	.12	.12	1.32

The postmaster-general may make provision for indemnity, insurance, and collection on delivery, with additional charges for such service, and may, with the consent of the interstate commerce commission after investigation, modify rates, weights, and zone distances, when experience has demonstrated the need therefor.

It will be observed that a local and rural free delivery parcels post has been provided for to

operate between various points on a rural route and a town post-office, at a much lower rate, the highest charge being 15 cents for 11 pounds.

Each post-office is to be provided with maps and special stamps of different colors indicating what zone the destination of the parcel is located in, from any given radial central unit.

JAMES L. COWLES,  
*Secretary Postal Progress League.*

**Parcenary.** In law, parcenary is the state or estate of two or more persons, called *parceners*, who hold title, as equal heirs, to land, each with a right to a separate share of it, even though undivided. This of course carries with it no benefit of survivorship.

**Parche.** One of the small but gorgeous coral-fishes, known best as "butterfly-fish" (q.v.).

**Parchim.** A town in Germany, in the Grand Duchy of Mecklenberg-Schwerin, situated on the Elbe about twenty miles southeast of Schwerin, on the railway from Ludwigslust to Neubrandenburg. It is an ancient town, founded about 1200, and surrounded by walls in the ancient style, and contains many interesting buildings including its quaint Gothic townhall. It is perhaps best known as the birthplace of Field-Marshal von Moltke, to whom a monument was erected in 1876. Parchim is now a busy industrial town, manufacturing cloth, celluloid, etc., and is one of the richest cities of Mecklenburg, owning much of the surrounding land. Pop. (1905) 10,498.

**Parch'ment.** See PALÆOGRAPHY.

**Parchment, Vegetable,** a substance first introduced in 1853. It is made by dipping ordinary unsized paper for a few seconds in concentrated sulphuric acid mixed with one-half its volume of water, and then quickly removing all trace of the acid. The mixture is allowed to cool before being used. This simple treatment produces a remarkable change in the paper. It acquires a parchment-like texture; turns translucent, especially when thin; and becomes about five times stronger than ordinary paper. Vegetable parchment is also impervious to water, but is rendered soft and limp when dipped into it. A solution of chloride of zinc acts on paper in a similar way. In the manufacture of vegetable parchment a roll of paper is by a mechanical arrangement pulled through a vat containing the sulphuric acid (the time of immersion being from five to ten seconds for thin paper), next through water, then through a weak solution of ammonia, and once more through water. It is afterward passed through felt-covered rollers, and then calendered.

**Pardee, pār'dē, Ario,** American philanthropist: b. Chatham, N. Y., 10 Nov. 1810; d. Florida 26 March 1892. He was educated in district schools and in 1830 entered the engineering corps of the Delaware and Raritan canal in New Jersey. He afterward engaged in railroad surveying and in 1838-40 was superintendent of the Hazleton Railroad and Coal Company. Subsequently he became interested in the operation of coal and iron mines and in this field amassed an immense fortune. At the outbreak of the Civil War he equipped a company at his

own expense and later was a munificent benefactor of Lafayette College and other institutions. He was a director of several railroads and at the time of his death was a trustee in Lafayette College.

**Pardee, George Cooper**, American physician and political leader: b. San Francisco, Cal., 25 July 1857. He was educated at the University of California, at the Cooper Medical College, and at the University of Leipsic, Germany. In 1885 he returned to California from abroad, began the practice of medicine as an eye and ear specialist, and was soon recognized as one of the leaders of his profession. He was also active in public life, was a member of the Oakland board of health and city council, and carried on a vigorous and successful campaign in behalf of pure water and against the licensing of poolroom gambling. In 1893 a reform movement in city politics was organized, and he was elected mayor for two years; in this office he compelled the corporation owning the waterworks to reduce its high charges, and dealt with the railroad strike of 1894. In 1898 he was a candidate for the Republican nomination for governor, but was not nominated, and in 1900 was a delegate to the Republican National Convention. In 1899 he was appointed a regent of the University of California. In 1902 he obtained the Republican nomination for governor, and after a vigorous campaign was elected; the most important opposition to his election came from the labor element on account of his action during the strike of 1894. As governor he favored the extension of the civil service and the preservation of the forests.

**Pardo, pãrdô, Manuel**, Peruvian statesman: b. Lima, Peru, 12 Aug. 1834; d. there 16 Nov. 1878. He was educated in Chile and in Europe, paying much attention to the study of law and political economy. For a time he was in government employ, then retired to private life, but in 1865 was appointed secretary of the treasury by President Prado, which office he filled with great ability. In 1869 he was elected mayor of Lima and in 1872 was elected to the presidency. His inauguration was opposed by Tomas Gutierrez, the minister of war under President Balta, who dissolved congress, imprisoned Balta and declared himself dictator. Pardo was compelled to flee, but when the dictator was killed in an uprising of the populace he returned and took the office 2 Aug. 1872, the first civilian president of Peru. His administration was one of great benefit to the country. He improved the financial condition of the country, aided the advancement of science and literature, crushed a rebellion in Moquegua and upon the expiration of his term of office in 1876 prepared to retire from public life, but was elected to the senate, of which body he was president when assassinated in 1878. His death was mourned as a national calamity.

**Pardo-Bazán, pãrdô-bã-thân', Emilia**, Spanish novelist and critic: b. La Coruña, Galicia, 1852. In 1891 she established and entirely wrote a critical review, 'Nuevo Teatro Critico.' Her literary reputation in Spain was won by her works of fiction, generally classed as naturalistic, most satisfactory in picturesque delineations of Galician landscapes and manners. Among them are 'Los Pazos de Ulloa'; 'La Piedra An-

gular'; 'Pascual Lopez'; the collection of short stories, 'Cuentos de Marinada'—Marinada being La Coruña—; 'Una Cristiana'; and its sequel, 'La Prueba.' Among her critical writings is a prize essay, 'Estudio de las Obras del Feijóo' (1876); 'San Francisco de Asis' (2d ed. 1886), and 'La Revolución y la Novela en Rusia' (1887). The descriptive volumes, 'Mi Romeria' (1888) and 'De mi Tierra' (1888) contain patriotic views of local scenes. Consult Garcia, 'Literatura Española en el Siglo XIX,' (1891).

**Pardoe, pãrdô, Julia**, English author: b. Beverley, Yorkshire, England, 1806; d. London, England, 26 Nov. 1862. She early evinced literary ability, and her first work, a volume of poems which appeared when she was 13 reached a second edition. She was sent to Portugal for her health and while there wrote 'Traits and Traditions of Portugal' (1833), which attracted considerable attention. She was a versatile writer, her books including works of travel, history, and fiction. Some of the best known are: 'The City of the Sultan' (1836); 'Louis the Fourteenth and the Court of France in the 17th Century' (1847); 'Life of Marie de' Medici' (1852); 'A Life-Struggle' (1859); etc.

**Paré, pâ-râ, Ambroise**, French surgeon: b. Bourg Hersent, near Laval, department of Mayenne, 1517; d. Paris 20 Dec. 1590. He studied at Paris and in 1536 attached himself as surgeon to the army destined to serve in Italy under Marshal René de Montejean. In 1542 he accompanied the Viscount de Rohan during his campaign at Perpignan. In 1552 he became surgeon to Henry II., under whose successors (Francis II., Charles IX., and Henry III.) he held the same post. His enemies were numerous among the physicians, who accused him of having poisoned Francis II. It was formerly believed that Paré was a Protestant, and that he was saved from the massacre of St. Bartholomew by Charles IX., but M. P. Valet has proved that he was a Catholic. He introduced improvements in the treatment of gun-shot wounds, in the operation of trepanning, and in amputation. He also introduced or restored the practice of tying up divided arteries and operated on articular concretions. A noteworthy edition of his works was produced by Malgaigne in 1840-41. See the 'Life' by Paulmier (1884), and Paget, 'Ambroise Paré and his Times' (1897).

**Parédes, pâ-rã-dãs, Diego Garcia de**, Spanish soldier: b. Truxillo, Spain, 1466; d. Bologna, Italy, 1530. He served in the Moorish war from 1485 to the fall of Granada in 1492, and then went to Italy where he received from Pope Alexander VI. an important command in the papal army. In 1499 he joined the forces of Gonsalvo de Cordova under whom he served in the war against the Turks in 1501; defended Naples against the French and Spanish in 1502, and in 1503 was at the siege of Ruvo and the battle of Cerignola. At the sieges of Verona and Vicenza and in 1525 at Pavia he won high honor for his courage, and he has been frequently compared with the Chevalier Bayard as regards bravery, honor, and loyalty. Consult De Vargas, 'Vida de D. Garzia de Paredes' (1621).















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